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October 23, 2003

To: Supervisor Yvonne Brathwaite Burke, Chair
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From: David E. Janssen
Chief Administrative Officer

UPDATED BIOLOGICAL RESOURCES COMMENTS - LAX MASTER PLAN (ITEM NO. 21, AGENDA OF OCTOBER 28, 2003)

Item No. 21 on the October 28, 2003 is the Final Report on the Supplemental to the Draft Environmental Impact Statement/Environmental Impact Report (SDEIS/EIR) for the Proposed Safety and Security Alternative (Alternative D) for the Proposed Master Plan Improvements at Los Angeles International Airport (LAX). Included as an attachment to the Final Report is a review of the impact on biological resources of the LAX Master Plan prepared by Land Protection Partners. This report was prepared in August 2001 on the previous alternative under consideration by Los Angeles World Airports (LAWA).

While the information contained in the 2001 report is still largely applicable to the new Alternative D, Land Protection Partners have just recently updated their report to specifically address changes reflected in Alternative D; the updated report is attached for your information. Specifically, the updated report concludes that many of the problems identified in the 2001 review have not been addressed in the SDEIS/EIR, observing that, "[t]he SDEIS/EIR does nothing to improve the fatally flawed assessment methodology for direct impacts to sensitive biological resources that was presented in the DEIS/EIR [previous alternative]."

Land Protection Partners is separately submitting the updated report to LAWA and the Federal Aviation Administration as their formal comments. The report includes résumés for the two authors, reflecting extensive professional expertise and experience, including several peer-reviewed scientific articles and publications.

If you have any questions, please let me know, or your staff can contact Lari Sheehan, Assistant Administrative Officer, at (213) 974-1174.

DEJ:LS
MKZ:os

Attachment

c: Executive Officer, Board of Supervisors
County Counsel
Director of Planning
Director of Public Works
Director and Chief Medical Officer of Health Services
Honorable James K. Hahn, Mayor of the City of Los Angeles
Jim Ritchie, Los Angeles World Airports
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Review of Biological Resources Analysis in Supplement to Draft Environmental Impact Statement/Environmental Impact Report for LAX Master Plan

Travis Longcore, Ph.D.
Catherine Rich, J.D., M.A.

October 20, 2003

Review of Biological Resources Analysis in Supplement to Draft Environmental Impact Statement/Environmental Impact Report for LAX Master Plan

This review pertains to the Federal Aviation Administration/Los Angeles World Airports Supplement to Draft Environmental Impact Statement/Environmental Impact Report ("SDEIS/EIR") for the LAX Master Plan. The scope of this review is limited to biological resources, and consequently addresses Sections 4.10 (Biotic Communities), 4.11 (Endangered and Threatened Species of Flora and Fauna), 4.12 (Wetlands), 4.14 (Coastal Zone Management and Coastal Barriers), and 4.18 (Light Emissions). The review was prepared by Dr. Travis Longcore and Catherine Rich, who are experts in the ecology and history of the natural communities that would be affected by the proposed airport expansion and in the assessment of environmental impacts under the California Environmental Quality Act, National Environmental Policy Act, and California Coastal Act. Dr. Longcore has co-authored several peer-reviewed scientific articles on the El Segundo dunes and the Los Angeles coastal prairie (including its vernal pools),[1] which both would be adversely affected by the proposed project.

The SDEIS/EIR complements, but does not replace, the original Draft Environmental Impact Statement/Environmental Impact Report ("DEIS/EIR") for the LAX Master Plan. The SDEIS/EIR does nothing to improve the fatally flawed assessment methodology for direct impacts to sensitive biological resources that was presented in the DEIS/EIR. Rather, the SDEIS/EIR provides only a trivial and meaningless change in the name of the methodology from "modified Habitat Evaluation Procedure" to "Mitigation Land Evaluation Procedure" ("MLEP"). The SDEIS/EIR attempts to improve the analysis of indirect impacts on biological resources, including the effects of light, noise, and air pollution, but the analysis is illogical and unsupported by the literature. Finally, the SDEIS/EIR presents impact analysis for the newly-formulated Alternative D.

With the exception of the analysis of Alternative D, which triggered the preparation of a Supplement, the new biological resources analysis appears to consist primarily of responses to comments on the DEIS/EIR, including those of the resources agencies and perhaps our own.[2] In our 2001 review, we noted the failure of the DEIS/EIR to provide an adequate assessment of the effects of light and noise on biological resources, illustrated the gross inadequacy of the "modified Habitat Evaluation Procedure," and identified contradictions in the project description. Because many of the problems that we identified in our 2001 review have not been addressed in the SDEIS/EIR, we incorporate our earlier comments by reference (see attached without appendices). This review evaluates the updated analysis of biological impacts and associated mitigation measures presented in the SDEIS/EIR.

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1. Mattoni, R., T. Longcore, C. Zonneveld, and V. Novotny. 2001. Analysis of transect counts to monitor population size in endangered insects: the case of the El Segundo blue butterfly, *Euphilotes bernardino allyni*. *Journal of Insect Conservation* 5(3):197–206. Longcore, T., R. Mattoni, G. Pratt, and C. Rich. 2000. On the perils of ecological restoration: lessons from the El Segundo blue butterfly. Pp. 281–286 *in* J.E. Keeley, M. Baer-Keeley, and C.J. Fotheringham (eds.) *2nd Interface Between Ecology and Land Development in California*. U.S. Geological Survey, Sacramento, California. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles coastal prairie, a vanished community. *Crossosoma* 26(2):71–102.
2. Longcore, T., and C. Rich. 2001. Review of biological resources analysis in LAX Master Plan Draft Environmental Impact Statement/Environmental Impact Report. Land Protection Partners, Los Angeles. 27 pp. + appendices.

1.0 Project Description

The maps of land use for the airport properties are updated in the Supplement to depict the four Alternatives. These maps are somewhat clearer than those in the DEIS/EIR about the land use of the ~100 acres of El Segundo dunes not included in the Habitat Restoration Area. While the DEIS/EIR included maps depicting this area as a golf course or resort hotels,[3] the SDEIS/EIR identifies that area as "Airfield/Airport Open Space."[4] The description of Alternatives does not, however, provide conclusive details about the long-term disposition of this biologically important area.[5] The long-term plans for this property are important to the analysis of mitigation measures because the SDEIS/EIR contemplates that some habitat mitigation activities will occur in this area, outside of the ~200-acre Habitat Restoration Area.[6]

We note that the depiction of the 100 acres of El Segundo dunes north of the Habitat Restoration Area as "Airfield/Airport Open Space" diverges from the previous positions articulated by the City of Los Angeles. In the staff report for issuance of a Coastal Development Permit for landscaping along Waterview Street at the northern end of this area, the City in 2001 wrote, "The Project, a narrow, landscaped area along the streets, would provide a buffer between the golf course and residential areas…."[7] As we noted in our previous comments, the zoning for the parcels in the dunes was set at [Q]OS-1-XL in 1994, which disallows development in the dunes habitat preserve and restricts use of the remainder of the property to "a nature preserve and accessory uses only."[8] In the Land Use section of the SDEIS/EIR, while the entire 300 acres of the El Segundo dunes are designated as "Open Space," the map refers to the "Los Angeles Airport/El Segundo Dunes Specific Plan" as the descriptor.[9] This Specific Plan has been superceded by the 1994 zoning update, but this fact is not reflected in the various maps in the SDEIS/EIR. The restriction of the northern 100 acres of the dunes to "nature preserve and accessory uses" should be clarified in the Final EIS/EIR.

2.0 Direct Impacts

2.1 Mitigation Land Evaluation Procedure (formerly "modified Habitat Evaluation Procedure")

The modified Habitat Evaluation Procedure presented in the DEIS/EIR has been renamed the Mitigation Land Evaluation Procedure in the SDEIS/EIR.[10] This methodology was rejected outright by the U.S. Fish and Wildlife Service ("USFWS") and the California Department of Fish and Game ("CDFG") in comments on the DEIS/EIR, but the SDEIS/EIR retains the methodology while simply changing the name, "to eliminate confusion associated with a similarity in the designation to an unrelated methodology developed by the USFWS."[11] This change in terminology does not correct the faulty

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3. DEIS/EIR, Appendix J1. Biological Assessment Technical Report, Figures 8, 11, 14.
4. SDEIS/EIR, Figures S3-2, S3-4, S3-5, S3-6, S3-7, S3-8.
5. SDEIS/EIR, Section 3. Alternatives (Including Proposed Action).
6. SDEIS/EIR, MM-BC-4 through MM-BC-8, MM-BC-10 through MM-BC-13.
7. City of Los Angeles 2001. Coastal Development Permit Application No. 00-05 Final Staff Report, p. 3.
8. City of Los Angeles. Ordinance No. 169,767, effective June 12, 1994.
9. SDEIS/EIR, Figures 4.2-6, 4.2-9, 4.2-12, 4.2-15.
10. SDEIS/EIR, p. 4-449.
11. *Id.*

assumptions of the underlying method, and does nothing to correct the deficiencies in this method that were identified by the USFWS, CDFG, and our previous review.

The SDEIS/EIR uses the Mitigation Land Evaluation Procedure to determine impacts to sensitive vegetation types and to quantify impacts to habitats of sensitive species.[12] The name change is a *de facto* confirmation that the "methodology" is not based on an accepted technique, the "Habitat Evaluation Procedures" ("HEP")[13] developed by the U.S. Fish and Wildlife Service, but rather was invented for this analysis. While the HEP is an established method with a history of usage,[14] the MLEP is not a recognized method for the evaluation of impacts to sensitive species or vegetation types, or the determination of mitigation ratios for such impacts. Because the SDEIS/EIR does not reprint the methodology it has renamed MLEP, further discussion of the MLEP must refer to the DEIS/EIR.

The MLEP sets habitat evaluation standards based on an "optimal" site with "a multitude of floral and faunal species."[15] One would expect that each vegetation type would be compared against an optimal site of that same vegetation type, but this is not the case. Rather, the MLEP inexplicably compares all vegetation types against a valley needlegrass grassland/vernal pool complex. One might also expect that the habitat evaluation for each species would incorporate features relevant to that species' survival. This is not true either, because the habitat evaluation standards bear no relation to species requirements. For example, we compared the habitat evaluation standards in the MLEP to the habitat requirements of loggerhead shrike (*Lanius ludovicianus*) and black-tailed jackrabbit (*Lepus californicus bennettii*) (Table 1),[16] and found no nexus. The MLEP assigns low values of 0.25 for vegetation types that are occupied by these species (non-native grassland/ruderal), even though this vegetation is quite good habitat for both species. Furthermore, because the MLEP compares all vegetation types against one vegetation type, the MLEP results in the false conclusion that habitat values lost by destruction of one vegetation type can be mitigated by enhancing a completely different vegetation type.

This critical failure bears repeating. The single set of standards used to evaluate all vegetation types does not reflect ecological value, either to sensitive species or as vegetation communities. This problem derives from the physical and biological criteria used to evaluate habitat and the so-called "ecosystem functional integrity" components of the analysis. Rather than developing criteria for each vegetation type, the MLEP evaluates all vegetation types against the characteristics found in a "reference site." The vegetation type chosen for this standard is that of valley needlegrass grassland/vernal pool complex.[17] For some inexplicable reason, all vegetation types are measured against this standard, including southern foredune, southern dune scrub, and disturbed dune scrub/foredune. Dune vegetation does not exhibit many features found in a valley needlegrass grassland/vernal pool complex. Because dune vegetation does not have vernal pools and associated species, these vegetation dune types are assigned lower

12. DEIS/EIR, p. 4-615, SDEIS/EIR, p. 4-449.
13. U.S. Fish and Wildlife Service. 1996. Fish and Wildlife Service manual, 870 FW 1, Habitat Evaluation Procedures. [online at http:policy.fws.gov/870fw1.html]. U.S. Fish and Wildlife Service. 1980. Habitat as the basis for environmental assessment, 101 ESM. U.S. Fish and Wildlife Service. 1980. Habitat Evaluation Procedures (HEP), 102 ESM.
14. Johnson, T.L., and D.M. Swift. 2000. A test of a habitat evaluation procedure for Rocky Mountain bighorn sheep. *Restoration Ecology* 8(4S):47–56.
15. DEIS/EIR, p. 4-616.
16. Because the MLEP is the "modified HEP" with a different name, our analysis is the same as provided in our 2001 comments.
17. DEIS/EIR, p. 4-615.

"habitat" values — 0.35 for both southern dune scrub and disturbed dune scrub/foredune, and 0.45 for southern foredune. This ranking merely illustrates that dune scrub is not good valley needlegrass grassland/vernal pool complex, but it says nothing about whether it is good dune scrub.

Table 1. Relevance of Mitigation Land Evaluation Procedure Standards to Two Sensitive Species

MLEP Standards	Relevance to value of area as black-tailed jackrabbit habitat	Relevance to value of area as loggerhead shrike habitat
TOPOGRAPHY		
Mound-depression microrelief	None. Species occurs in a variety of topographic conditions.	None
Native soils w/ slope <10%	None	None
Areas w/ period of inundation $\geq$ 30 days	None. Can serve as vectors for seed dispersal between vernal pools, but not necessary for habitat.[18]	None
Summer desiccation	None	None
FLORA		
>10% vegetative cover	Some. Forage and cover must be present.	Some. Vegetation must support prey populations.
Native grasses >10%	None. Will forage on all manner of grasses, forbs, and shrubs.[19]	None
Vernal pool associated species	None	None
Listed vernal pool associated species	None	None
FAUNA		
Domination of native fauna (reproducing)	None	None
Grassland associated species (reproducing)	None	None
Sensitive vernal pool associated species	None	None
Listed vernal pool associated species	None	None
ECOSYSTEM FUNCTIONAL INTEGRITY		
Contiguity w/ wetland and State-designated sensitive terrestrial habitat	None	None
Designated sensitive terrestrial habitat	None	None
Under regulatory conservation	None	None
Variety of pollinator/dispersal mechanisms present (wind, wildlife)	None. Is itself a dispersal agent.	None
Contiguous native habitat > 40 acres	Potentially important. Size of habitat, whether native or not, is important.	Potentially important. Size of habitat, whether native or not, is important.

18. Zedler, P.H., and C. Black. 1992. Seed dispersal by a generalized herbivore: rabbits as dispersal vectors in a semiarid California vernal pool landscape. *The American Midland Naturalist* 128(1):1–10. (Jackrabbits play a similar role in the vernal pool landscape.)
19. Johnson, R.D., and J.E. Anderson. 1984. Diets of black-tailed jack rabbits in relation to population density and vegetation. *Journal of Range Management* 37(1):79–83. MacCracken, J.G., and R.M. Hansen. 1982. Herbaceous vegetation of habitat used by blacktail jackrabbits and Nuttall cottontails in southeastern Idaho. *American Midland Naturalist* 107(1):180–184. Jameson, E.W., Jr., and H.J. Peeters. 1988. *California mammals*. University of California Press, Berkeley.

The portion of habitat value deriving from "ecosystem functional integrity" is another wholesale creation of the DEIS/EIR, and by extension the SDEIS/EIR. The choice of standards is arbitrary, with little to do with the sensitive species and vegetation types under analysis. Whether a site is "under regulatory conservation" does not necessarily have anything do with the ecological value of its vegetation type for sensitive species. Similarly, "contiguity with state-designated habitat" is not an ecological criterion. "Variety of pollinator/dispersal mechanisms present" is oriented toward vernal pool vegetation, and the choice of "contiguous native habitat >40 acres" is arbitrary.

The MLEP fundamentally obscures the reality that sensitive plants and wildlife utilize vegetation that is not dominated by native species. Loggerhead shrikes forage in ruderal and non-native grasslands as well as in dune scrub. Jackrabbits are thriving in an area with little native plant component. Furthermore, the MLEP asserts that landscaped areas within the airport grounds contain "habitat units," even though these areas support neither sensitive vegetation communities nor sensitive species. The MLEP is therefore of no use in evaluating the impacts to native wildlife, or in devising mitigation schemes for those impacts. The MLEP is so flawed that it completely fails to establish the nexus for mitigation of impacts.

We are not saying that it would be impossible to develop a scheme to assess vegetation communities that assigns lower area equivalence to degraded vegetation. Indeed, the suggestion by CDFG that non-native grasslands be mitigated at a 0.5:1 ratio is implicit recognition of such an approach. A preliminary effort to develop a "habitat hectares" scheme has been published in the scientific literature, but it is fundamentally different from the MLEP.[20] A valid "habitat area" approach should include the following features: 1) incremental values of habitat areas are assigned strictly on biological criteria, 2) these criteria are developed separately for each vegetation type, and 3) the results are not applied as proxies for the habitat requirements of individual wildlife species.[21] The MLEP violates all three of these conditions. (Technically, this type of approach should not be called a "habitat area" approach, because "habitat" is a specific term that is defined relative to an individual species.[22])

2.2 Alternative D

The SDEIS/EIR discloses that the new, preferred Alternative D would result in direct destruction of 1.53 acres of sensitive habitat for the construction of navigational aids and associated service roads within the El Segundo dunes, both inside and outside the Habitat Restoration Area. This would include removal of 0.8 acres of disturbed foredune, 0.5 acres of disturbed grassland, and 0.2 acres of foredune.[23] The acreage may sound minimal to the casual reader, but the raw acreage does not reveal the true extent of project impacts because it conceals the spatial configuration of the development. The Biotic Communities analysis fails to reveal the geographic arrangement of the proposed construction, and does not consider this critical information in the assessment of impacts. This information about configuration is important because if the navigational aids are scattered, a greater area will be subjected to "edge effects" from adjacency to the new infrastructure and the construction. If they are clustered, then

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20. Parkes, D., G. Newell, and D. Cheal. 2003. Assessing the quality of native vegetation: the "habitat hectares" approach. *Ecological Management and Restoration* 4:S29–S38.
21. *Id.*
22. Hall, L.S., P.R. Krausman, and M.L. Morrison. 1997. The habitat concept and a plea for standard terminology. *Wildlife Society Bulletin* 25:173–182.
23. SDEIS/EIR, Table S4.10-4.

impacts will be lessened. Clustering of development is one of the basic tenets of conservation planning. Every site of disturbance within the dunes habitat is an area that is more easily invaded by exotic plants and arthropods. It is therefore troubling that the SDEIS/EIR contains no assessment of the configuration of this development footprint.

Configuration of the navigational aids on the dunes is found only in the Coastal Zone Management and Coastal Barriers section. A figure in that section reveals that the navigational aids will be installed at no fewer than 23 separate locations in two lines extending two thirds of the way across the dunes from east to west.[24] In addition, existing navigational aids will be removed from 12 other locations both in and out of the Habitat Restoration Area. Each new navigational aid will be 9 feet square, within a 15-foot service buffer. The total area of the new navigational aids is 0.2 acres, so the remaining 1.4 acres of identified disruption must be from new roads or other construction impacts. Therefore, from the new navigational aids alone, nearly 1,300 feet of new habitat edges will be introduced into the El Segundo dunes. It is furthermore unclear if habitat disruption from removal of existing navigational aids has been evaluated.

The impact analysis for Alternative D uses the flawed MLEP to calculate "habitat units" that will be lost for various sensitive species. These habitat units are essentially meaningless; the actual acres of lost habitat should be the basis for impact assessment. According to the SDEIS/EIR the following sensitive species will experience habitat loss in the following amounts: black-tailed jackrabbit, 23.76 acres; western spadefoot toad (*Spea hammondii*), 8.97 acres; loggerhead shrike, 83.25 acres.

The area of impacts to black-tailed jackrabbit is actually much larger than 23.76 acres. The area currently occupied by this species will be used as a construction staging area, which will eliminate far more habitat than the parking garage.[25] In addition, the mitigation measure for this species proposes relocating all of the jackrabbits to the El Segundo dunes. The resulting total loss of habitat is therefore closer to the 118.75 acres described for the other Alternatives.

Loss of habitat for jackrabbits, loggerhead shrikes, and western spadefoot toads constitutes a significant impact because the losses would appreciably diminish the ranges of these rare species. LAX supports the only population of jackrabbits in west Los Angeles and indeed, in most of the Los Angeles basin. LAX also supports one of the last western spadefoot toad populations in the Los Angeles basin. Surveys in 2003 for breeding loggerhead shrikes recorded fewer than six pairs within the Los Angeles basin (Kimball Garrett, Los Angeles County Museum of Natural History, pers. comm.), and the species has disappeared in recent years from regularly surveyed sites at Holy Cross Cemetery, Madroña Marsh, and other Los Angeles locations (Professor Hartmut Walter, UCLA Department of Geography, pers. comm.). All three of these species are on the verge of extirpation within a large cismontane geographic area, making any impacts to the populations at LAX highly significant. Cumulative impacts to these species, from the proposed project and other projects in the area, including the Catellus West Bluffs development, are highly significant.

The impact analysis for Alternative D (and the other Alternatives) does not address the "bomb disposal site" located within the Habitat Restoration Area. Consultants to LAX previously recommended that

24. SDEIS/EIR, Figure S4.14-1.
25. SDEIS/EIR, Figure S4.20-1.

this site be moved as part of the Master Plan process so that the ongoing adverse impacts to sensitive habitats (including scraping of restored areas, and disposal of debris within restored areas) could be avoided.[26]

The impact analysis does not provide a sufficient discussion of chemicals that would be used for dust suppression. The SDEIS/EIR suggests the use of "nontoxic" soil binders to reduce dust, but the compatibility of these chemicals with habitat restoration and biological communities in unknown or not reported, and so cannot be evaluated.

3.0 Indirect Impacts

The SDEIS/EIR provides additional discussion of the effects of light and noise on biological resources. While presenting marginally more information, the analysis and conclusions on both these topics are lacking in logic and scientific support.

3.1 Artificial Night Lighting and Wildlife

Discussion of the impacts of artificial night lighting on wildlife is hampered by the confusing use of terminology in the SDEIS/EIR. The issue is routinely described as an analysis of "light emissions," and the magnitude of lighting is described in foot-candles ("fc"). The difficulty with this is that foot-candles (or the SI equivalent lux) are measures of illumination within an area, not the emission of light from a source. Light emissions should be described in terms of luminance. Both illumination and luminance are relevant to assessment of the biological impacts of artificial lighting. Luminance is primarily associated with attraction and repulsion of animals, while illumination primarily results in orientation and disorientation.[27] Analysis of lighting should therefore clearly distinguish between illumination and luminance in considering impacts to wildlife.

The analysis of lighting impacts from all Alternatives lacks relevant spatial information to reach meaningful conclusions. For example, the baseline conditions within the dunes Habitat Restoration Area are described as ranging from 0.004 fc to 0.26 fc.[28] For all build scenarios, the SDEIS/EIR predicts that illumination will increase by 0.34 fc. The spatial distribution of this increase is not described, which makes it difficult to discern how large an area will be subjected to increased lighting from the project.

The SDEIS/EIR tries to reach the conclusion that current lighting levels have no adverse influence on wildlife. This conclusion is not supported by the facts. First, all lighting levels within the dunes were recorded during a night with a clear sky. Light reflected by clouds or fog is at a minimum on clear nights; ambient illumination may increase substantially on overcast or foggy nights.[29] The

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26. DEIS/EIR, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 509.
27. Health Council of the Netherlands. 2000. *Impact of outdoor lighting on man and nature*. Health Council of the Netherlands, The Hague.
28. SDEIS/EIR, p. 4-452.
29. Moore, M.V., S.M. Pierce, H.M. Walsh, S.K. Kvalvik, and J.D. Lim. 2000. Urban light pollution alters the diel vertical migration of *Daphnia*. *Verhandlungen der Internationalen Vereinigung fur Theoretische und Angewandte Limnologie* 27:779–782.

characterization of the baseline conditions does not therefore adequately represent lighting impacts, given the frequency of these meteorological conditions along the coast.

Second, the biological analysis asserts that only nocturnal and crepuscular species could be affected by artificial night lighting. This conclusion reveals a failure to understand basic ecology and an ignorance of the scientific literature. One of the common effects of artificial night lighting is to extend the activity period of a diurnal species into the nighttime hours. This has been well documented for birds,[30] and is so notable in reptiles that animals exhibiting such behavior have been characterized as using the "night light niche."[31] In another example, seals extended foraging time on salmon by using the lights from a bridge overhead.[32] Extended activity times for diurnal species results in disruption of interactions with other species. Species with extended activity periods may 1) subject other species to increased predation, 2) increase competition with nocturnal and crepuscular species, and 3) be subject to additional predation. The outcome of these altered species interactions will be positive, neutral, and negative for different members of the community, be they diurnal, crepuscular, or nocturnal. One experimental investigation reports the outcome of increased foraging time allowed by artificial lighting for butterfly larvae. The higher growth rate associated with longer photoperiod was offset by significantly higher predation on the butterfly larvae from the primary parasitoid species.[33] The SDEIS/EIR errs dramatically in claiming that diurnal species would not be affected by artificial night lighting.

Third, the SDEIS/EIR does not discuss the relevant literature to develop thresholds to determine adverse impacts from lighting. Rather, it draws on the rather illogical statement that because sensitive species are present in the dunes area with existing light levels, the light does not adversely affect these species.[34] Presence of a species in a degraded habitat does not mean that the habitat is not degraded. The conclusion of no impact from existing lighting cannot be drawn without knowing the density of sensitive species in the absence of artificial night lighting. Even using the measurements taken on a clear night for the SDEIS/EIR, artificial illumination on the dunes reaches 0.26 fc (2.8 lux), which is an order of magnitude greater than that provided by a full moon (~0.1 lux). The claim that illumination of this magnitude does not affect wildlife is untenable, given the known influences of lunar cycles on wildlife behavior. For example, scorpions stay closer to their burrows during the full moon.[35] Other animals,

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30. Goertz, J.W., A.S. Morris, and S.M. Morris. 1980. Ruby-throated hummingbirds feed at night with the aid of artificial light. *Wilson Bulletin* 92:398–399. Freeman, H.J. 1981. Alpine swifts feeding by artificial-light at night. *British Birds* 74(3):149. Hill, D. 1990. The impact of noise and artificial light on waterfowl behaviour: a review and synthesis of the available literature. British Trust for Ornithology Report No. 61, Norfolk, United Kingdom. Frey, J.K. 1993. Nocturnal foraging by scissor-tailed flycatchers under artificial light. *Western Birds* 24(3):200. Negro, J.J., J. Bustamante, C. Melguizo, J.L. Ruiz, and J.M. Grande. 2000. Nocturnal activity of lesser kestrels under artificial lighting conditions in Seville, Spain. *Journal of Raptor Research* 34(4):327–329. Thurber, W.A., and O. Komar. 2002. Turquoise-browed motmot (*Eumomota superciliosa*) feeds by artificial light. *Wilson Bulletin* 114(4):525–526.
31. Schwartz, A., and R.W. Henderson. 1991. *Amphibians and reptiles of the West Indies: descriptions, distributions, and natural history.* University of Florida Press, Gainesville.
32. Yurk, H., and A.W. Trites. 2000. Experimental attempts to reduce predation by harbor seals on out-migrating juvenile salmonids. *Transactions of the American Fisheries Society* 129(6):1360–1366.
33. Gotthard, K. 2000. Increased risk of predation as a cost of high growth rate: an experimental test in a butterfly. *Journal of Animal Ecology* 69(5):896–902.
34. SDEIS/EIR, p. 4-453.
35. Skutelsky, O. 1996. Predation risk and state-dependent foraging in scorpions: effects of moonlight on foraging in the scorpion *Buthus occitanus*. *Animal Behaviour* 52(1):49–57.

including snakes,[36] small mammals,[37] lagomorphs,[38] and bats,[39] similarly avoid foraging during the full moon to avoid the increased predation risk. With areas of the dunes subjected permanently to illumination brighter than that of a full moon, the conclusion that this baseline condition causes no impacts is not supported by scientific evidence. Even the dimmest illumination found in the baseline conditions at the dunes (0.004 fc = 0.043 lux) is still greater than the light of a quarter moon (0.01 lux), let alone a moonless clear night (i.e., starlight only with no light pollution; 0.001 lux), or a moonless overcast night (i.e., no starlight with no light pollution; 0.0001 lux).

With these natural illumination levels in mind, it becomes evident that impacts from additional light created by the project will be significant to wildlife. All project Alternatives would increase illumination within the Habitat Restoration Area so that illumination would range from 0.344–0.6 fc (3.7–6.5 lux). This illumination is 37 to 65 times brighter than that of a full moon. Given that the wildlife species of the dunes evolved for hundreds of thousands of years with, and are adapted to, a natural light regime with a maximum illumination of the full moon, and some wildlife species may detect and respond to illuminations below 0.01 or even 0.0001 lux,[40] an increase of 0.34 fc (3.6 lux) constitutes a significant adverse impact.

3.2 Noise and Wildlife

In our 2001 comments on the DEIS/EIR, we requested that the impact of noise on wildlife be analyzed. The SDEIS/EIR presents an analysis, but it is lacking in scope and logic.

The scope of the analysis of noise impacts is limited in the SDEIS/EIR to sensitive species only. While these impacts are important, this scope is unduly narrow, because it ignores impacts to wildlife species not designated as "sensitive" that are found in rare natural communities (also called "sensitive habitats"). Rare natural communities, such as southern foredune, dune scrub, and valley needlegrass grassland, are important for both their flora and fauna. It would defeat the purpose of protecting such sensitive habitats if impacts to the wildlife in those habitats are not analyzed. The noise analysis should therefore be expanded to consider impacts to the wide range of wildlife found in the sensitive habitats at LAX, and not limited to only those individual species designated as sensitive.

The logic of the noise analysis is also flawed. This is exemplified by the conclusion that, "Based on the analysis of existing noise levels at locations occupied by sensitive species, and the presence of sensitive species within these areas, it appears that current noise conditions do not adversely affect sensitive species at LAX."[41] Again, as is the case with the analysis of artificial night lighting, insufficient information is available in the SDEIS/EIR to draw this conclusion. If the density of sensitive species

36. Clarke, J.A., J.T. Chopko, and S.P. Mackessy. 1996. The effect of moonlight on activity patterns of adult and juvenile prairie rattlesnakes (*Crotalus viridis viridis*). *Journal of Herpetology* 30(2):192–197. Klauber, L.M. 1939. *Rattlesnakes: their habits, life histories, and influence on mankind.* Second edition. Vol. 1. University of California Press, Berkeley.
37. Lima, S.L. 1998. Stress and decision making under the risk of predation: recent developments from behavioural, reproductive, and ecological perspectives. *Advances in the Study of Behavior* 27:215–290.
38. Gilbert, B.S., and S. Boutin. 1991. Effect of moonlight on winter activity of snowshoe hares. *Arctic and Alpine Research* 23(1):61–65.
39. Rydell, J. 1992. Exploitation of insects around streetlamps by bats in Sweden. *Functional Ecology* 6:744–750.
40. Tarano, Z. 1998. Cover and ambient light influence nesting preferences in the Tungara frog *Physalaemus pustulosus*. *Copeia* 1998(1):250–251.
41 SDEIS/EIR, p. 4-453.

without elevated noise levels were known, and those densities remained the same with elevated noise, then perhaps a conclusion of no impact could be reached. But the SDEIS/EIR does not report density of occupation by any sensitive species (except El Segundo blue butterfly, *Euphilotes bernardino allyni*) and presents no comparison to suggest that densities would be the same in the absence of the noise associated with the fourth largest airport in the United States. Without these critical parts of a logical argument, the conclusion that existing noise does not affect sensitive species at LAX is unfounded.

Beyond the faulty conclusion that *current* noise levels do not affect sensitive species at LAX, the SDEIS/EIR also asserts that *increased* noise would not affect sensitive species. This conclusion is a result of the inappropriately narrow scope of the analysis and a failure to consider reasonable thresholds for noise effects. A rather exhaustive body of literature is referenced, but glossed over by the SDEIS/EIR, that illustrates the adverse impacts of airport noise on vertebrates, even at levels far below the thresholds in the SDEIS/EIR. Chronic noise, even at low levels, is associated with elevated stress hormone levels, higher blood pressure, faster heart rates, and other physiological effects.[42] As a result, birds, mammals, and other vertebrates may show anatomical differences (smaller body size, enlarged adrenal glands) from prolonged exposure to noise.

A study of the influence of aircraft overflights on birds is cited in the SDEIS/EIR, noting that "there were no major differences in the nesting productivity of the most abundant species, and the nesting success was high and similar for both the control site and the test site."[43] This reference is rather disingenuous, because it neglects to inform the reader that the Alaska study site experienced L_{max} below 70 dB(A) while the L_{max} at LAX ranges 90–140 dB(A) under the various Alternatives. This represents a considerable difference, because decibels are measured on a logarithmic scale.

Road noise, which is several orders of magnitude quieter than aircraft noise, has been documented to exert an adverse impact on breeding birds. Of 45 bird species investigated in woodlands in The Netherlands, 33 showed significantly depressed breeding density in response to increased noise levels near roads. All species in the small passerine families Sylviidae, Fringillidae, and Emberizidae were affected by noise.[44] Empirical measurement of the threshold value triggering decreased density in woodlands shows that for all bird species combined the threshold value is 42–52 dB(A), with individual species exhibiting thresholds as low as 36 dB(A) and as high as 58 dB(A).[45] Furthermore, years with overall low population densities showed lower threshold levels. Similar research has been conducted for

42. Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colorado. NERC-88/29. 88 pp.
43. Rozell, K.B. 2001. Effects of military overflights on nesting neotropical migrant birds. Alaska Bird Observatory, Fairbanks.
44. Reijnen, R., R. Foppen, and G. Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. *Biodiversity and Conservation* 6:567–581.
45. Reijnen, R., R. Foppen, C. ter Braak, and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32:187–202. Reijnen, R., and R. Foppen. 1995. The effects of car traffic on breeding bird populations in woodland. IV. Influence of population size on the reduction of density close to a highway. *Journal of Applied Ecology* 32:481–491. Reijnen, R., R. Foppen, and H. Meeuwsen. 1996. The effects of traffic on the density of breeding birds in Dutch agricultural grasslands. *Biological Conservation* 75:255–260.

grasslands. Overall, this research shows that breeding bird habitat is degraded at noise levels as low as 36 dB(A).[46]

Mammals are likewise vulnerable to impacts from chronic airport noise:

> Only a few studies of the physiological effects of noise on rodents have involved wild animals. A field study by Chesser et al. (1975) involved two populations of house mice near the end of a runway at Memphis International Airport. Adult mice also were collected from a rural field 2.0 km from the airport field. Background noise levels at both fields were 80–85 dB. Noise levels of incoming and outgoing aircraft at the airport field averaged 110 dB, with the highest reading reaching 120 dB. Total body weights and adrenal gland weights of mice from the fields were measured. Additional mice were captured from the rural field, placed in the laboratory, and exposed to 1 minute of 105-dB recorded jet aircraft noise every 6 minutes to determine if noise was the causative factor. Control mice were not subjected to noise. After 2 weeks, the adrenals were removed and weighed. Adrenal gland weights of male and female mice from the airport field were significantly greater than those of mice from the rural field. The noise-exposed mice in the laboratory study had significantly greater adrenal gland weights than the control mice. After ruling out stress factors, such as population density, Chesser et al. (1975) concluded that noise was the dominant stressful factor causing the adrenal weight differences between the two feral populations.[47]

While house mice are of no regulatory concern, native small mammals on the El Segundo dunes include harvest mouse, *Reithrodontomys megalotis*, and desert wood rat, *Neotoma lepida*, which are locally significant. But again, the SDEIS/EIR does not analyze these impacts because it concentrates only on sensitive species, and not on the full range of wildlife species in sensitive habitats.

The scientific literature provides ample evidence to conclude that the sensitive habitats at LAX are degraded by noise from airport operations and that increased noise would constitute a significant adverse impact.

4.0 Mitigation Measures

The SDEIS/EIR, because it relies on the MLEP to formulate mitigation measures for impacts to sensitive species and biotic communities, contains deeply flawed mitigation measures.

The SDEIS/EIR reports that all of the proposed project Alternatives will destroy four seasonal ponds occupied by western spadefoot toads on the south airfield. These populations number at least several hundred adults and all sites would be destroyed by the various project Alternatives. The SDEIS/EIR estimates occupied area as 8.97 acres of ephemerally wetted areas and adjacent upland habitats. Spadefoot toads require upland habitats surrounding their aquatic habitat.[48] It is unclear how upland habitats were measured for the SDEIS/EIR. Critically important in the analysis is that the species is found in four separate areas. Even though the areas are close to each other, the existing configuration of

46. Reijnen, R., R. Foppen, and H. Meeuwsen. 1996. The effects of traffic on the density of breeding birds in Dutch agricultural grasslands. *Biological Conservation* 75(3):255–260. Reijnen, R., R. Foppen, and G. Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. *Biodiversity and Conservation* 6(4):567–581.
47. Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colorado. NERC-88/29. 88 pp.
48. Ruibal, R., L. Trevis, and V. Roig. 1969. The terrestrial ecology of the spadefoot toad *Scaphiopus hammondii*. *Copeia* 572–584.

habitat patches is important to reduce risk to the species from a catastrophic event (e.g., chemical spill). Depending on the separation of the pools, there may still be genetic exchange among the populations in each. These risk dynamics should be considered when evaluating the impact on the species and potential mitigation measures.

Loss of the LAX population of western spadefoot toads would cause a significant restriction of the range of the species. Because of the significance of the LAX population to the range of the species, mitigation areas should be as close as possible to the existing sites. The first choice should be within the 100 acres north of the Habitat Restoration Area where vernal pools were found historically.[49] This site would not require land acquisition and would be consistent with achieving other mitigation goals within this area. Furthermore, the biological consultants for the LAX Master Plan recommend that this site be restored with vernal pools.[50] The second priority for creation of habitat and reintroduction of western spadefoot toad is the West Bluffs site. While this site is currently graded for development, the owner is willing to sell the property, which historically supported appropriate vernal pool habitat. The area of the reintroduction site must at least equal the area occupied at LAX. Given the difficulty of restoring habitat and establishing rare species, a 3:1 mitigation ratio for pool surface area would be more appropriate. This surface area must be accompanied by surrounding upland habitat at a ratio of 10 to 15 acres for each acre of pool surface area. Ideally the mitigation pool surface area would be divided among at least three pools to minimize the effects from a possible catastrophic event.

Mitigation for impacts to Riverside fairy shrimp (*Branchinecta sandiegoensis*) should use the same pool system as developed for the western spadefoot toad.

The SDEIS/EIR suggests that the impact of destroying at least 83 acres of habitat for loggerhead shrike can be mitigated by enhancing habitat within the El Segundo dunes. As proposed, this mitigation measure will not be successful. It suggests that the loss of 83 acres of habitat can be offset by enhancing habitat within 300 acres of existing, occupied habitat. The SDEIS/EIR presents no evidence that the 300 acres of the El Segundo dunes could support a greater density of shrikes. Surveys of the El Segundo dunes in 1995 and 1998 showed this area to be occupied by breeding shrikes.[51] An average of six individuals per survey were seen within the Habitat Restoration Area in 1995.[52] Territory size for loggerhead shrikes on the Channel Islands is large, 34 ha (~84 acres),[53] while mainland territories are somewhat smaller, 4.4–16.0 ha (~10.9–39.5 acres).[54] Assuming the Habitat Restoration Area supports three pairs of breeding shrikes, the territory size would be ~27 ha (~66.7 acres). Experts familiar with shrikes and the El Segundo dunes doubt that the mitigation measure would be successful in increasing shrike density in this occupied habitat (Professor Hartmut Walter, UCLA Department of Geography, pers. comm.).

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49. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles coastal prairie, a vanished community. *Crossosoma* 26(2):71–102.
50. DEIS/EIR, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 508.
51. DEIS/EIR, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 227.
52. DEIS/EIR, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, pp. 469–483.
53. Scott, T.A., and M.L. Morrison. 1990. Natural history and management of the San Clemente loggerhead shrike. *Proceedings of the Western Foundation for Vertebrate Zoology* 4:23–57.
54. Miller, A.H. 1931. Systematic revision and natural history of the American shrikes (*Lanius*). *University of California Publications in Zoology* 38:11–242.

Only one of the three proposed enhancement activities (removal of roads) could be conducted within the Habitat Restoration Area. The other enhancement activities would be conducted outside the Habitat Restoration Area. If enhancement will occur outside the Habitat Restoration Area, then the mitigation measure must establish that restored areas will be protected permanently as natural habitat. The SDEIS/EIR fails to state that mitigation areas outside of the Habitat Restoration Area will be permanently protected.

Enhancement to improve habitat for loggerhead shrikes might also have adverse consequences on other species. Shrikes are fond of Jerusalem crickets as forage.[55] The Jerusalem cricket found at the El Segundo dunes is a sensitive endemic species.[56] This is meant only to illustrate that artificially increasing the density of one species is not necessarily consistent with management for other species or for maximum biological diversity. Similarly, as discussed below, enhancement to support a large population of jackrabbits would conflict with the provision of habitat for El Segundo blue butterflies.

The proposed mitigation for impacts to black-tailed jackrabbits involves relocation from a ruderal grassland to the Habitat Restoration Area, which contains southern dune scrub and foredune scrub vegetation. It is likely that this mitigation measure will not succeed. First, the 200 acres (81 ha) of the Habitat Restoration Area will support a lower density of jackrabbits than the open grassland they now inhabit. Black-tailed jackrabbits are generalist herbivores, and therefore can survive in a range of vegetation types. The density of jackrabbits differs, however, with the composition of the vegetation. Sites that have very high grass cover relative to shrubs and forbs support far greater densities. For example, a steppe habitat with 59% grass, 10% forb, and 31% shrub cover supported 18.4 jackrabbits per ha, and density decreased with increasing shrub cover to 1.4 individuals per ha at 91.0% shrub cover.[57] Because the Habitat Restoration Area is intended to support scrub habitats, jackrabbits could only persist at a far lower density than they do in their current habitat at the Airport Operations Area, meaning a much larger area would be required to support the population. Furthermore, the SDEIS/EIR does not consider the possible reasons that black-tailed jackrabbits are no longer present on the dunes, even though they were present historically. For some reason the population was extirpated, and unless the forces that caused the extirpation are removed, the mitigation will fail. We see two possible explanations. First, the small population size within the Habitat Restoration Area was vulnerable to random events simply because it was small. If this is true, then the relocation will eventually fail unless the dunes are managed to maintain a larger population size to the detriment of other sensitive species on the dunes, including El Segundo blue butterfly. A second possible explanation for the disappearance of jackrabbits from the dunes can be deduced from the timing of their extirpation. According to surveys in the DEIS/EIR, jackrabbits died out (or were killed) sometime between surveys in 1978 and 1988.[58] The other major change in the mammal fauna between 1978 and 1988 was the appearance of the non-native red fox as a breeding resident on the dunes. Red fox are recorded predators of black-tailed jackrabbits, so the invasion and success of this predator may have resulted in the elimination of jackrabbits. If this is true, any jackrabbit relocation program must be accompanied by a humane red fox (and feral cat/dog) control program.

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55. Myers, H.W. 1922. *Western birds*. The Macmillan Company, New York, p. 249.
56. Mattoni, R.H.T. 1990. Species diversity and habitat evaluation across the El Segundo sand dunes at LAX. Los Angeles Department of Airports, Los Angeles.
57. Johnson, R.D., and J.E. Anderson. 1984. Diets of black-tailed jack rabbits in relation to population density and vegetation. *Journal of Range Management* 37(1):79–83.
58. DEIS/EIR, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 493.

Mitigation for Lewis' evening primrose (*Camissonia lewisii*) does not ensure that a replacement population of the species will be created, only that more individuals will be grown on the El Segundo dunes, where the species is already found. In addition to establishing a numerical goal for the number of individuals to be replaced, mitigation should ensure that the area occupied by the species will increase by at least the 2.5 acres that would be lost. Because there is a risk-spreading benefit in the disjunct configuration of the impacted population, the mitigation site should be geographically distinct from currently occupied sites.

Mitigation Measure MM-ET-4 describes actions to mitigate impacts to El Segundo blue butterfly from Alternative D. It contains the following provisions, summarized and quoted from here, that deserve comment based on our previous experience[59] with such mitigation efforts: 1) avoid flight season for construction, such that construction occurs between October 1st and May 31st, 2) mitigate the number of plants of coast buckwheat at 1:1 ratio, 3) "salvage existing coast buckwheat plants and any larvae on the plant or in the soil below the plant that would be removed," and 4) salvage any El Segundo blue butterfly larvae from plants that are not salvaged.[60] While it may seem intuitive to avoid construction during the adult flight season, the species may indeed be more vulnerable at other times because individuals are in diapuase as pupae in the sand beneath the plants. While flying adults can escape physical disturbance in the environment, pupae cannot move to avoid being crushed. If the Section 7 consultation with USFWS results in a "no jeopardy" determination, the following strategy would reduce impacts to the butterfly. Plants that will be impacted should be carefully removed in the late Spring before adult butterflies eclose by cutting them at the surface of the sand. This minimizes disturbance to pupae in the duff and sand below. Then construction should be delayed until after the ensuing flight season. Butterflies that emerge to find their plants gone will be forced to emigrate to nearby habitat. If desired, the affected areas can be searched for pupae after the flight season to locate any pupae in multiple-year diapause. Relocation of mature coast buckwheat plants is not a cost efficient means of mitigation. Most plants will die, and the butterfly would be better served by restoring more habitat with container plants. Given the timing of the construction phase, the existing measure incorrectly refers to salvage of larvae at a time when only pupae would be found. Finally, mitigation at a 1:1 ratio for plants is insufficient. The mitigation ratio for direct impacts to this rare natural community should be at a 5:1 ratio on an area basis rather than a per plant basis. The impacts to 0.24 acres of occupied El Segundo blue butterfly habitat (which will be scattered across the Habitat Restoration Area) should be mitigated by restoration of 1.25 acres of the vegetation type in similar topoclimatic configuration. Impacts to backdune areas should be mitigated by restoring backdune vegetation, not by planting a remote foredune area as contemplated by the mitigation measure.

5.0 Conclusion

The full DEIS/EIR, including the new Supplement, fails to provide a realistic assessment of the impacts of the proposed project on biological resources, including sensitive species and rare natural communities. The centerpiece of the analysis of direct impacts is a fatally flawed methodology. This methodology confuses the distinction between habitat and vegetation type, and even fails to account for

59. Longcore, T., R. Mattoni, and A. Mattoni. 2003. Final report for Palos Verdes blue butterfly pupal salvage on Palos Verdes and San Pedro housing, San Pedro, California. The Urban Wildlands Group, Los Angeles (Department of the Navy Letter Agreement # N68711-02-LT-C3001). 9 pp.
60. DSEIS/EIR, p. 4-494.

differences between vegetation types. The assessment of indirect impacts relies on illogical assertions (e.g., if a habitat is degraded for a species then further degradation will have no adverse impact), and fails to consider the scientific literature and its application to the impact analysis.

The magnitude of the LAX Master Plan development and its impacts to wildlife habitat for all four Alternatives, combined with the regional setting and cumulative impacts from development in the City of Los Angeles, lead to the conclusion that implementation of the Master Plan will have significant adverse impacts on biological resources. The mitigation measures proposed to offset these impacts are wholly insufficient to reduce these impacts to a less than significant level.

Appendix A

Review of Biological Resources Analysis in LAX Master Plan Draft Environmental Impact Statement/Environmental Impact Report

Land Protection Partners

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Review of Biological Resources Analysis in LAX Master Plan Draft Environmental Impact Statement/Environmental Impact Report

August 8, 2001

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Catherine Rich, J.D., M.A.

Review of Biological Resources Analysis in LAX Master Plan
Draft Environmental Impact Statement/Environmental Impact Report

This review pertains to the Federal Aviation Administration and Los Angeles World Airports Joint Draft Environmental Impact Statement/Environmental Impact Report ("EIS/R"). It addresses Sections 4.10 (Biotic Communities), 4.11 (Endangered and Threatened Species of Flora and Fauna), 4.12 (Wetlands), 4.14 (Coastal Zone), and 4.18 (Light Emissions). The review was prepared by Dr. Travis Longcore and Catherine Rich, who are experts in the ecology and history of the natural communities that would be affected by the proposed airport expansion. Dr. Longcore has co-authored several peer-reviewed scientific articles on the El Segundo Dunes and the Los Angeles Coastal Prairie (including its vernal pools),[1] which both would be adversely affected by the proposed project.

The presentation of information in the EIS/R about biological resources is segmented into several sections. For the purpose of this review, however, all biological resource issues are treated together, because mitigation measures for biological impacts are largely the same.

1.0 Project Description

For the purpose of discussing the impacts to biological resources, the EIS/R does not provide a complete project description. Within the extent of the Master Plan boundaries, it is unclear what the disposition of certain areas of biologically significant property will be. In maps of the various project alternatives, the legend indicates useless designations such as "Airport Related."[2] There is no way to ascertain with certainty what the use of such land will be under the various alternatives.

1.1 Failure To Analyze Northside/Southside Project

The EIS/R describes the LAX Northside Project as "Collateral Development" that previously has been entitled through the CEQA process.[3] Reliance on old CEQA documentation is problematic, and development of this project would seem to require a reopening of the environmental review, especially given the changed conditions since the approval in 1983. However, the real difficulty is that the EIS/R replaces the LAX Northside Project with the Westchester Southside Project in each of the three build alternatives for the Master Plan. These projects are not the same, and even if the CEQA documentation for the Northside Project is deemed adequate, the Southside Project must be fully analyzed under CEQA. The EIS/R does not completely describe or analyze the biological impacts of the Southside Project.

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1. Mattoni, R., T. Longcore, C. Zonneveld, and V. Novotny. 2001. Analysis of transect counts to monitor population size in endangered insects: the case of the El Segundo blue butterfly, *Euphilotes bernardino allyni*. *Journal of Insect Conservation* 5(3):197–206. Longcore, T., R. Mattoni, G. Pratt, and C. Rich. 2000. On the perils of ecological restoration: lessons from the El Segundo blue butterfly. Pp. 281–286 *in* J.E. Keeley, M. Baer-Keeley, and C.J. Fotheringham (eds.) *2nd Interface Between Ecology and Land Development in California*. U.S. Geological Survey, Sacramento, CA. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles Coastal Prairie, a vanished community. *Crossosoma* 26(2):71–102.
2. EIS/R, Figures 3-6, 3-11, 3-15.
3. EIS/R, pp. 3-20, 3-29.

The Westchester Southside Project, as depicted in the EIS/R,[4] would include the conversion of 100 acres of the El Segundo Dunes to a golf course. (Several figures in the EIS/R appendices map this area at the northern portion of the dunes as "golf course/open space" and include "Resort Hotels" within the same color designation. At a minimum the maps indicate some level of development of the dunes as part of the Westchester Southside Project.) The dunes golf course/open space development was not included in the CEQA analysis for the LAX Northside Project, and remains unanalyzed for compliance with any environmental laws (CEQA, NEPA, California Coastal Act). It is inappropriate for the EIS/R to rely on the Westchester Southside Project — which is a site for relocation of displaced businesses[5] — for mitigation, and not to evaluate the full impacts of the development. While all of the El Segundo Dunes are within the Master Plan area, and the alternatives themselves show no development on the 100 acres at the northern end of the dunes, the result of adopting any of the three project alternatives is to develop 100 acres of dunes in association with "Resort Hotels" and "golf course/open space."[6] The resource value of this area is discussed later, but the analysis of the Westchester Southside Project should not be piecemealed. Currently, the biological impacts of the Westchester Southside Project do not seem to be analyzed fully, nor are they included in the discussion of cumulative impacts for the project. Even if one accepts the premise of the EIS/R that the project will proceed absent approval of the Master Plan, the Westchester Southside Project is "reasonably foreseeable" — in fact relied upon for mitigation — and all of its impacts must be disclosed and mitigated as part of the Master Plan EIS/R.

The decision not to address the biological impacts of the Westchester Southside Project can be interpreted as a strategic choice to avoid disclosure of the full impacts of the airport expansion project. From a biological standpoint, the Westchester Southside Project, even though it would involve fewer square feet of built space than the LAX Northside Project (2.6 million square feet vs. 4.5 million square feet), it has a larger geographic footprint and greater biological impact. Any of the three build alternatives plus the Westchester Southside Project would be a catastrophe for the biological resources found at LAX.

1.2 Previous Failure To Disclose Impacts of Development on El Segundo Dunes

Los Angeles World Airports ("LAWA") has previously failed to disclose impacts of development on the El Segundo Dunes. In 1999, a newspaper story announced that LAWA was planning to install landscaping on the northern end of the El Segundo Dunes, along Waterview, Rindge, and Napoleon streets. The Urban Wildlands Group, a Los Angeles-based nonprofit whose board includes the authors of this letter, contacted LAWA to inform project managers of the sensitive resources present and request that the project not include invasive plants that would degrade the dunes. LAWA promised, but then failed to provide, the plant list for the project. LAWA proceeded to implement the project, but failed to secure the proper permits from the City of Los Angeles as required under the California Coastal Act. After installing a new walkway and over 90 mature, non-native palm trees in a sensitive habitat area,[7]

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4. EIS/R, Appendix J1. Biological Assessment Technical Report, Figures 8, 11, 14.
5. EIS/R, pp. 3-33, 3-47, 3-56.
6. City of Los Angeles Ordinance 169,767 restricts use of the northern 100 acres of the El Segundo Dunes at LAX to "nature preserve and accessory uses only." This ordinance was passed unanimously by the City Council on April 6, 1994 as part of the General Plan/Zoning Consistency Program. Given this unequivocal direction from the City, it is unclear why the Master Plan is ambiguous about the disposition of this area, unless the intention is to attempt to remove the development conditions from the property and seek another use as part of the Westchester Southside Project.
7. Installation of palm trees is damaging ecologically, and also provides sites for birds to perch, potentially increasing bird strikes with aircraft. Consultants for the airport report that "[t]he El Segundo Dunes provides relatively few attractants

(cont'd)

LAWA was instructed to stop work by the California Coastal Commission, told that it must obtain a permit, and subsequently applied for a permit from the City. The Urban Wildlands Group opposed the permit application for the partially implemented project because it would significantly disrupt habitat values of an environmentally sensitive habitat area ("ESHA"), as defined under the California Coastal Act.[8] The City analysis of the project also agreed that the site was an ESHA.[9] The appeal of the permit was denied by the City of Los Angeles Board of Public Works with the stipulation that LAWA resolve the issue in consultation with The Urban Wildlands Group and those residents opposed to the palm trees. This has not yet happened.

LAWA steadfastly maintains that the 100 acres outside of the El Segundo Blue Butterfly Preserve is not part of the El Segundo Dunes and that it will be developed as a golf course.[10] The area, however, is within the jurisdiction of the California Coastal Commission, and no approved Local Coastal Plan has been produced that would allow for a golf course. The EIS/R provides even more information to join previously published sources[11] showing that the area is an environmentally sensitive habitat area and therefore protected by Section 30240(a) of the California Coastal Act. For example, the EIS/R itself discloses that El Segundo blue butterflies (*Euphilotes bernardino allyni*) occupy one subsite,[12] sensitive Lewis' evening primrose (*Camissonia lewisii*) occupies seven subsites,[13] and the area is occupied by sensitive species such as silvery legless lizard (*Anniella pulchra*), San Diego horned lizard (*Phrynosoma coronatum blainvillei*),[14] loggerhead shrike (*Lanius ludovicianus*; breeding),[15] and Dorothy's sand dune weevil (*Trigonoscuta dorothea dorothea*).[16] The golf course or other development on the dunes should either be analyzed as part of the Master Plan EIS/R for conformance with applicable laws, including the California Coastal Act, or be explicitly deleted from the plans for the area. The EIS/R should offer some certainty about what development will take place within the Master Plan boundaries and disclose the impacts of that development.

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to birds which may partially account for the significantly lower percentage of strikes occurring over this area than over the approach area. The El Segundo Dunes naturally supports very few trees — the only trees present are non-native trees that have been planted…." (EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 341). Without complete environmental review, LAWA planted more attractants for birds in the form of palm trees. The EIS/R also reports that the native birds of the dunes are not involved in bird strikes, while species promoted by urban development, such as pigeons and gulls, are involved in the most strikes.

8. California Public Resources Code §§ 30107.5, 30240.
9. City of Los Angeles. 2001. Coastal Development Permit Application No. 00-05 Final Staff Report, p. 5, "Consequently, for Coastal Act analysis purposes, the Project site is within an environmentally sensitive habitat area…."
10. Personal communication with Steve Crowther, LAWA Environmental Management Bureau, March 9, 2000, by telephone with Dr. Travis Longcore. City of Los Angeles 2001. Coastal Development Permit Application No. 00-05 Final Staff Report, p. 3, "The Project, a narrow, landscaped area along the streets, would provide a buffer between the golf course and residential areas…."
11. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452.
12. EIS/R, Appendix J1. Biological Assessment Technical Report, Figure 20.
13. EIS/R, Figure 4.10-2.
14. EIS/R, Figure 4.10-4.
15. EIS/R, Figure 4.10-5. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 244.
16. EIS/R, Appendix J1. Biological Assessment Technical Report, p. 214.

2.0 Current Conditions

The description of current conditions of the biological resources within the Master Plan boundaries is biased toward underestimating the value of the habitats that will be impacted.

2.1 Surveys

A great deal of effort was expended surveying the insects of the El Segundo Dunes, especially within the El Segundo Blue Butterfly Preserve, even though this area is not targeted for direct development. Surveys for areas that would be subject to significant direct impacts were inadequate. It appears that only one type of survey — sweep netting — was conducted east of Pershing Drive in the areas that would be most affected by development. This single method would not detect all of the sensitive species that might occur in the area. For example, the El Segundo Jerusalem cricket (*Stenopelmatus* sp.), a burrowing insect, would not be detected with sweep netting. Pitfall trapping would be required to ascertain its presence, and should be performed in the areas of project impacts east of Pershing Drive. Other survey methods, including black lighting and malaise trapping, were conducted only west of Pershing Drive on the El Segundo Dunes, not in the areas of direct project impacts.

While the extensive surveys conducted on the El Segundo Dunes may be useful for evaluating the impacts of the Westchester Southside Project, which the EIS/R does not do, they offer little information to understand the biological communities supported in the open spaces that would be developed under the three development alternatives. For example, the EIS/R provides no summary of the bird surveys conducted at the ephemeral wetlands and open spaces found in the western area of the airport, and provides only handwritten notes buried in the appendices.[17] A summary would be useful to understand the character of the biotic communities in these areas. Species of local conservation concern such as Costa's hummingbird (*Calypte costae*), western meadowlark (*Sturnella neglecta*), and common yellowthroat (*Geothlypis trichas*) were recorded in these areas, yet no complete description of the communities is provided in the text of the document. The biological consultants for the EIS/R report that the ephemeral wetland area at the west end of the airport "provides resting and foraging habitat for numerous resident and migratory bird species,"[18] but the EIS/R provides no summary of these observations or description of the impact of development on these species.

For the El Segundo Dunes, an extensive list of birds is found, complete with species that are almost certainly not present at all. The "Floral Compendium" and "Faunal Compendium" include "species observed or expected to occur on or in the immediate vicinity of the site."[19] On this list are found species that are highly unlikely to be present on the dunes or even near the dunes. For example, acorn woodpecker (*Melanerpes formicivorus*) is not likely to be found on the El Segundo Dunes now or in recent history. Acorn woodpeckers in Los Angeles would be associated with coast live oaks, which are found nowhere on the El Segundo Dunes or the Los Angeles Coastal Prairie. The rather excessive bird list in the Faunal Compendium is made ever more curious by the statement elsewhere by the biological

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17. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, pp. 224 (Memo-Results of Directed Surveys for American Peregrine Falcon, et al., 1998), 292 (Memo-Results of Spring Directed Surveys for Burrowing Owl, 1998), 311 (Memo-Results of Winter Directed Surveys for Burrowing Owl, 1998), 416 (Memo-Wildlife Survey of the Argo Ditch, 1997).
18. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 340 (Memo-Aircraft Bird Strike Literature Review).
19. EIS/R, Appendix J1. Biological Assessment Technical Report, Appendix A, pp. 1–5.

consultants for the EIS/R that "the Dunes does not support a large resident bird population."[20] It is odd to include these ambitious lists, because the biological analysis does not evaluate the impacts of the three alternatives on the species of wildlife in them.

2.2 "Determined Absent"

The summary table for sensitive species provided in Section 4.10 of the EIS/R is misleading. For many species, the table indicates that they have been "determined absent" from the Master Plan boundaries based on directed surveys. When dealing with small arthropods that are difficult to capture, persist at low numbers, and may have large annual variation in numbers, one cannot conclude that a species is "determined absent." All that can be done is to state that the species was not found during a certain duration and intensity of searching. It is likely that the survey methodology did not possess sufficient statistical power to detect the species.[21] Presence may be determined conclusively, but absence cannot, especially for cryptic (i.e., small or camouflaged) species. Some degree of certainty about absence could be derived if one had knowledge of the population size, yearly variation in population size of the species, and the trapping efficiency of the survey methods. This information is not available, and therefore no statistically defensible declaration of absence can be made about the sensitive arthropod species.

In other instances, the declaration of absence is contradicted by the reports upon which the section is based. For example, Table 4.10-2 claims that the following species are absent from the Master Plan boundaries: Henne's ecosman moth (*Eucosa hennei*), Rivers' dune moth (*Euxoa riversii*), Ford's sand dune moth (*Psammobotys fordi*), El Segundo scythrid moth (*Scythris* new sp.), lesser dunes scythrid moth (*Scythris* new sp.), El Segundo goat moth (*Comadia intrusa*), and Santa Monica dunes moth (*Copeblepharon sanctamonicae*). However, in the underlying report, Frank Hovore, the surveyor, writes:

> Sensitive moth species (general *Comadia, Copeblepharon, Euxoa, Psammobotrys* [sic], *Scythris*) — A wide variety of moth specimens, including some possibly representing all of these species except *Psammobotrys* [sic], were taken in light traps, but moths in the traps were rendered unidentifiable by the combination of alcohol and churning actions of other species. All of the moth species previously known to occur on the dunes probably persist, because all of the known larval hosts are present. For most moth species, focused light collecting would be necessary to determine presence and distribution, using dry traps or light sheets. Very large numbers of *Psammobotrys* [sic] were collected on the dunes historically (LACM collection), and it is assumed that this species is present, but is highly seasonal and difficult to collect without sustained and focused field efforts.[22]

The text presented in Table 4.10-2 of the EIS/R contradicts the surveys that were conducted. Far from being absent, as maintained in Table 4.10-2, a qualified surveyor determined that the methodology was insufficient to determine presence of these moth species, but that the species were indeed probably

20. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 342 (Memo-Aircraft Bird Strike Literature Review).
21. Gibbs, J.P., S. Droege, and P. Eagle. 1998. Monitoring populations of plants and animals. *Bioscience* 48(1):935–940.
22. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 214 (Memo-Results of Spring Surveys for Gastropods and Arthropods, 1998).

present. Mischaracterization such as this undermines the credibility of the description of current conditions presented in the EIS/R.

2.3 Terminology

The EIS/R is inconsistent in its use of terminology describing the 100 acres north of the El Segundo Blue Butterfly Preserve. This area, along with the preserve, is part of the El Segundo Dunes.[23] It has been degraded through residential construction and intrusion of exotic plant species, but it remains of significant biological value and is itself a sensitive habitat (see above, Section 1.2). In various places in the EIS/R, this area is referred to as "dunes and adjacent landforms," "non-restructured dunes,"[24] "100 acres north of Sandpiper Street,"[25] and "the 100-acre open space north of the preserve."[26] Implicit in the choice of terminology for this area is perhaps the intention to construct a golf course upon it. The Los Angeles Airport/El Segundo Dunes Specific Plan, adopted in 1992, incorrectly claims that "approximately 100 acres of the Dunes ... do not contain significant habitat resources."[27] The Specific Plan requires the proposed golf course to provide revenue for the upkeep of the dunes habitat preserve,[28] thereby lifting that burden from LAWA, which perhaps partially explains LAWA's enthusiasm for the idea. However, existing zoning for the area — established more recently than the Specific Plan — is as a nature preserve. EIS/R maps should be consistent with the existing "nature preserve" zoning and should consistently acknowledge this area as part of the El Segundo Dunes.

The EIS/R also exhibits some difficulty with terminology to describe the habitat that formerly was found throughout the entire project area inland of the El Segundo Dunes. In a published article, Mattoni and Longcore describe this area as the Los Angeles Coastal Prairie, and document the historic plant diversity and the presence of extensive vernal pools.[29] The article has been commended as an exemplar of the practice of historical ecology in *The Historical Ecology Handbook: A Restorationist's Guide to Reference Ecosystems.*[30] For some reason, the EIS/R avoids using the Mattoni and Longcore article where it could be useful. For example, Mattoni and Longcore provide documentation of many sensitive species historically present within the study area from herbarium label texts. This includes a full list of vernal pool species historically found in the area, as well as upland forbs, grasses, and shrubs. Instead, the EIS/R chooses to classify the site as Valley Needlegrass Grassland. The historic evidence does not support the assumption that this area was dominated by perennial grasses; rather it was dominated by forbs. This is an important conclusion of Mattoni and Longcore's research that the EIS/R neither accepts nor attempts to dispute.

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23. Mattoni, R.H.T. 1992. The endangered El Segundo blue butterfly. *Journal of Research on the Lepidoptera* 29(4):277–304. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles Coastal Prairie, a vanished community. *Crossosoma* 26(2):71–102. U.S. Fish and Wildlife Service. 1998. *Recovery plan for the El Segundo blue butterfly (Euphilotes battoides allyni).* U.S. Fish and Wildlife Service, Portland, Oregon, 67 pp.
24. EIS/R, p. 4-619.
25. EIS/R, p. 4-614 (this is listed separately from "the Los Angeles/El Segundo Dunes").
26. EIS/R, p. 3-20.
27. City of Los Angeles General Plan, Los Angeles Airport/El Segundo Dunes Specific Plan. Ordinance No. 167,940. June 28, 1992.
28. *Id.* at 6.
29. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles Coastal Prairie, a vanished community. *Crossosoma* 26(2):71–102.
30. Egan, D., and A. Howell. 2001. Introduction. Pp. 1–23 *in* D. Egan and A. Howell (eds.) *The Historical Ecology handbook: a restorationist's guide to reference ecosystems.* Washington, D.C.: Island Press.

2.4 Disturbed Dune Scrub/Foredune

Concurrent with the changing terminology about the portion of the El Segundo Dunes not found within the habitat preserve is the decision to classify all dune scrub/foredune outside of the preserve area as disturbed dune scrub. While it is true that the dunes area outside the habitat preserve has a heavier exotic species load, and does not support coast buckwheat (*Eriogonum parvifolium*), it nevertheless has more biological value than is implied by the description. For example, this area supports sensitive plants (Lewis' evening primrose, *Camissonia lewisii*), birds (loggerhead shrike, *Lanius ludovicianus*), and arthropods (see above, Section 1.2). Mattoni et al. describe the ex-residential area in their 2000 article:

> Removal of the residences in the 1970s was superficial, leaving some foundations, substantial rubble, foreign soil, roads, and other infrastructure. Vegetation regenerated without assistance, producing a cover of predominately iceplant (*Carpobrotus edulis*) and acacia (*Acacia cyclopis*) with patches of a few highly dispersive dune shrub species.[31]

However, not all ex-residential sites supported the same arthropod communities. Some sites within the ex-residential area supported terrestrial arthropod communities (including rare and sensitive species) that were similar to those found on undisturbed foredune and undisturbed backdune sites.[32] This variation in the vegetation and associated wildlife across the 100 acres should be reflected in the EIS/R. The wholesale characterization of the area as "disturbed dune scrub/foredune" is misleading in terms of its value to the dune system and proper statutory designation as an ESHA.

2.5 El Segundo Blue Butterfly

Much ado is made over the population size of the El Segundo blue butterfly ("ESB"). However, the methodology used to calculate population size by LAWA is flawed and overestimates population size by at least 400%. While many methods to track trends in butterfly population size exist in the scientific literature,[33] when LAWA hired consultants in 1994 to prepare the EIS/R, they inexplicably used none of the established methods. While consultants continued walking a transect to count butterflies established by Mattoni in 1984, they stopped conducting surveys throughout the entire season. It is absolutely

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31. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452, at 446.
32. *Id.* at Table 1, Figure 2.
33. Pollard, E., D.O. Elias, M.J. Skelton, and H.A. Thomas. 1975. A method of assessing the abundance of butterflies in Monks Wood National Nature Reserve in 1973. *Entomologist's Gazette* 26:79–88. Pollard, E. 1977. A method for assessing change in the abundance of butterflies. *Biological Conservation* 12:115–132. Pollard, E. 1984. Synoptic studies of butterfly abundance. Pages 59–61 *in* R.I. Vane-Wright and P.R. Ackery (eds.) *The biology of butterflies.* Academic Press, London. Pollard, E. 1988. Temperature, rainfall and butterfly numbers. *Journal of Applied Ecology* 25(3):819–828. Zonneveld, C. 1991. Estimating death rates from transect counts. *Ecological Entomology* 16:115–121. Moss, D., and E. Pollard. 1993. Calculation of collated indices of abundance of butterflies based on monitored sites. *Ecological Entomology* 18(1):77–83. Pollard, E., D. Moss, and T.J. Yates. 1995. Population trends of common British butterflies at monitored sites. *Journal of Applied Ecology* 32(1):9–16. Van Strien, A.J., R. Van De Pavert, D. Moss, T.J. Yates, C.A.M. Van Swaay, and P. Vos. 1997. The statistical power of two butterfly monitoring schemes to detect trends. *Journal of Applied Ecology* 34(3):817–828. Brown, J.A., and M.S. Boyce. 1998. Line transect sampling of Karner blue butterflies (*Lycaeides melissa samuelis*). *Environmental and Ecological Statistics* 5(1):81–91. Royer, R.A., J.E. Austin, and W.E. Newton. 1998. Checklist and "Pollard walk" butterfly survey methods on public lands. *American Midland Naturalist* 140(2):358–371. King, R.S. 2000. Evaluation of survey methods for the Karner blue butterfly on the Necedah wildlife management area. *Transactions of the Wisconsin Academy of Sciences Arts and Letters* 88:67–75.

essential to survey throughout the flight season of the butterfly to obtain an estimate of total population size. Furthermore, rather than using an established method to analyze transect counts, Dr. Andrew Huang, an engineer at LAWA, constructed his own method to estimate population size. This method is flawed, and these flaws were explained by Dr. Travis Longcore to Dr. Huang in an email earlier this year, portions of which bear repeating here. The message describes methods used to estimate population size of the ESB by Longcore and others in a scientific article that was at that time in review and has subsequently been accepted for publication in an international scientific journal, the *Journal of Insect Conservation.*

> The first method [of calculating population size] was the Pollard Index, which is quite straightforward and about which there can be no argument. There is not a lot of latitude in summing the average weekly count over the course of the season.
>
> The second method is essentially the same as your numerical approximation. This method is first used, albeit with different data sources, by Watt et al in 1977 (Watt, Ward B., Frances S. Chew, Lee R. G. Snyder, Alice G. Watt, and David E. Rothschild. 1977. Population structures of Pierid butterflies I. Numbers and movements of some montane *Colias* species. *Oecologia* 27:1–22.) Watt at al. estimated "total animals [butterflies] present in the brood" by estimating daily butterfly numbers through MRR and extrapolation, summing them to calculate total animal-days, and multiplying this number by the death rate (determined by MRR). Dividing by the longevity (or residence time) would yield the same result. This is what we did, using Arnold's 1979 residence time estimates (ave 6.1 days). Your model does not divide by average longevity, but rather another figure. This is what I don't understand. What is wrong with the logic (used by Watt et al. as well) that the total brood size is equal to the total number of butterfly-days divided by the average butterfly longevity?
>
> $$\frac{\text{butterfly-days}}{\text{longevity (days)}} = \text{butterflies}$$
>
> Your model does something similar, calculating total butterfly days by integrating under the curve (gaussian or not) and dividing by a figure. The question, and the crux of the differences in our results, is the number that you divide by, which is 1.59. You get your number by parameterizing based on the recapture rates. I think the difficulty with this is that you do not know the age of the butterflies that were initially captured. Your method would work if all of the butterflies captured by Arnold on the first day were freshly eclosed adults. However, they cannot be. Some of them will be one, two, or more days old. Failure to account for this will skew your estimate of longevity downwards, and your total population estimate upwards. Now, I am going to guess that you will say that 1.59 days is not the longevity. But if it is not, what is it? Can you see a flaw in the logic of the Watt et al. method or otherwise reconcile it with your method?
>
> One last thing on this method. Our application of it gave a population estimate for 1984 at LAX of 432, while Arnold's MRR estimate was 664, and the Zonneveld model estimated 910. Application of your method would give an estimate of 1,658. (Note: in case you want to calculate these numbers, with the exception of Arnold's estimate, they include an adjustment for the number of flowerheads) (Arnold, R.A. (1986) Studies of the El Segundo blue butterfly - 1984. Inland Fisheries Administrative Report 86-4.)
>
> The third method that we used was the Zonneveld model. What is interesting is that our estimates of death rate (3.3–5.9 days), which vary from year to year, are similar to those given by Arnold (2.3–7.3 days) from MRR. We followed the model as set out by Zonneveld in the 1991 paper. We did not doubt the magnitude of the results because of the correspondence with the Watt et al method, the Pollard index, and the reasonableness of the longevity estimates.[34]

34. Longcore, T. 6 March 2001. Email to Dr. A. Huang.

Dr. Huang did not defend his method, stating in a response to Dr. Longcore, "You have raised many outstanding issues. ... I am very busy with a number of projects. I won't be able to respond to your questions for awhile."[35] To date, he has not provided a substantive response. The EIS/R should therefore be adjusted to reflect El Segundo blue butterfly population numbers that are calculated using the best available scientific methods. Three methods of evaluating the transect counts are given in the *Journal of Insect Conservation* paper, the proofs of which are appended to this report.[36]

As is evident from the literature about butterfly population size estimation,[37] the block counts promoted in the EIS/R are useful only to determine presence of the butterfly, not to estimate population size. The most perplexing part of the discussion of ESB population size by LAWA, both in reports by its consultants and in the EIS/R, is that none of the relevant scientific literature is referenced. Butterflies are conspicuous organisms, and schemes were developed in the 1970s to track population size, yet these are ignored. Sometimes remaking the wheel can lead to innovation, but in this instance it has led to confusion and the propagation of the myth that there are 40,000–80,000 El Segundo blue butterflies on the LAWA property. For example, LAWA claims that in 1998 there were roughly 12,000 ESB along the transect,[38] while proper analysis of the data indicates a population of 3,356 ± 805 S.D.[39] Similarly extravagant claims for the period 1996–2000[40] should be revised.

The EIS/R discussion of the ESB population size provides a diversion from the real issues at hand. Recovery of the species and downlisting from endangered to threatened status requires securing all of the El Segundo Dunes, including that area not currently in the habitat preserve.[41] The 200-acre preserve is still vulnerable to disease, adverse weather, fire, and other accidents. Long-term extinction risk for the butterfly can be minimized through increasing habitat area, not simply by relying on existing areas to provide spectacular numbers. Furthermore, concentration on the El Segundo blue butterfly draws attention away from the ten other endemic invertebrates found on the dunes whose continued persistence depends on habitat values beyond those needed to maintain the butterfly.[42]

LAWA's persistent strategy has been to focus on the butterfly and the 200-acre preserve to the exclusion of all else. For example, in the above-described Waterview Street Landscaping Project, LAWA's main claim in support of the project was that it did not affect the butterfly preserve or the butterfly. None of the appellants had argued that the project directly affected the butterfly, and pointed instead to the other sensitive species and habitats found on the project site. This notwithstanding, there are legitimate impacts to the El Segundo blue butterfly that would result from the alternatives in the EIS/R.

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35. Huang, A. 7 March 2001. Email to Dr. T. Longcore.
36. Mattoni, R., T. Longcore, C. Zonneveld, and V. Novotny. 2001. Analysis of transect counts to monitor population size in endangered insects: the case of the El Segundo blue butterfly, *Euphilotes bernardino allyni*. *Journal of Insect Conservation* 5(3):197–206.
37. *Id.*
38. Huang, A. November 25, 1998. Estimate of LAX El Segundo Blue Butterfly (ESB) Population (unpublished report).
39. Mattoni, R., T. Longcore, C. Zonneveld, and V. Novotny. 2001. Analysis of transect counts to monitor population size in endangered insects: the case of the El Segundo blue butterfly, *Euphilotes bernardino allyni*. *Journal of Insect Conservation* 5(3):197–206, at Table 2.
40. EIS/R, Appendix J1. Biological Assessment Technical Report, Table 4.
41. U.S. Fish and Wildlife Service. 1998. *Recovery plan for the El Segundo blue butterfly (Euphilotes battoides allyni).* U.S. Fish and Wildlife Service, Portland, Oregon, 67 pp.
42. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452, at 450.

3.0 Assessment of Impacts

While the EIS/R identifies impacts to biological resources, its improper quantification of those impacts results in an underestimation of the actual biological consequences of the build alternatives and ultimately the incorrect conclusion that those impacts can be mitigated to a less than significant level.

3.1 Direct Impacts

The EIS/R uses what it calls a "modified Habitat Evaluation Procedure" to determine impacts on sensitive vegetation types and to quantify impacts to habitats of sensitive species.[43] This procedure is supposedly based on "Habitat Evaluation Procedures" ("HEP")[44] previously developed by the U.S. Fish and Wildlife Service that have some degree of scientific validity and history of usage.[45] However, the methodology employed in the EIS/R uses the name of this procedure without incorporating any of the essential elements of the analysis. By comparing existing habitat for sensitive species against an abstracted, ideal habitat type, the EIS/R argues that loss of up to 500 acres of habitat for sensitive species can be mitigated by "improving" 100 acres of land already in a nature preserve. This conclusion is not supported by any accepted methodology of impact assessment and seems to have been specifically designed to underestimate the actual impacts to sensitive species at LAX.

HEP was designed for use with target species by the U.S. Fish and Wildlife Service in the 1970s to provide a form of standardization and comparability for environmental analysis. In HEP implementation, the term "habitat" is defined as the biophysical requirements of an individual species (e.g., bald eagle habitat), not as a general term synonymous with vegetation type (e.g., grassland habitat). The U.S. Fish and Wildlife Service states this in the guiding policies for HEP implementation:

> HEP is a species-habitat approach to impact assessment; and habitat quality for selected evaluation species is documented with an index, the Habitat Suitability Index (HSI). This value is derived from an evaluation of the ability of key habitat components to supply the life requisites of selected species of fish and wildlife.[46]

The explicit species-based approach of the HEP is apparent in the manual describing the procedure:

> HEP is a species-based assessment methodology. It is applicable only for the species evaluated and does not directly relate that species with other ecosystem components. HEP conceptually addresses only the issues of species populations and habitats.[47]

The "modified" HEP in the EIS/R does not establish which species will be used to evaluate the value of the reference sites, nor does it create HSIs for them. Rather, it sets habitat evaluation standards based on an "optimal" site with "a multitude of floral and faunal species."[48]

43. EIS/R, p. 4-615.
44. The EIS/R refers to a "Habitat Evaluation Procedure" in the singular form, while the U.S. Fish and Wildlife Service manual calls the method "Habitat Evaluation Procedures" in the plural form. We abbreviate both as "HEP" and treat the acronym as a singular noun indicating a methodology.
45. For example, see Johnson, T.L., and D.M. Swift. 2000. A test of a habitat evaluation procedure for Rocky Mountain bighorn sheep. *Restoration Ecology* 8(4S):47–56.
46. U.S. Fish and Wildlife Service. 1996. Fish and Wildlife Service manual, 870 FW 1, Habitat Evaluation Procedures. [online at http:policy.fws.gov/870fw1.html].
47. U.S. Fish and Wildlife Service. 1980. Habitat as the Basis for Environmental Assessment, 101 ESM.

The "modified" HEP does not provide information about the value of habitats within the subject site for several of the sensitive species found there. For example, it does not consider the habitat requirements of loggerhead shrike (*Lanius ludovicianus*) or black-tailed jackrabbit (*Lepus californicus bennettii*). It assigns values of 0.25 for vegetation types that are occupied by these species (Non-Native Grassland/Ruderal). By definition under a true HEP, occupied sites would score much higher. By "modifying" the HEP to address an abstract ideal habitat, actual habitat values to sensitive species are ignored (see below, Table 1).

In fact, the "modified" HEP resembles actual HEP implementation only superficially, in that values between 0 and 1 are assigned to certain arbitrary standards for vegetation types within the study area. None of the essential features of HEP are present in the modified method; the "modified" HEP therefore does not provide the basis for impact assessment in the project area.[49]

Not only is the "modified" HEP quite different from the actual procedure, the standards used to evaluate habitats do not reflect ecological value. This problem derives from the physical and biologic criteria used to evaluate habitat and the so-called "ecosystem functional integrity" components of the analysis. Rather than using target species and HSIs to characterize vegetation types as required in HEP, the EIS/R evaluates whether each of the vegetation types in the project area meets the characteristics found in a "reference site." The habitat type chosen for this standard is that of Valley Needlegrass Grassland/Vernal Pool complex[50] (i.e., Los Angeles Coastal Prairie). For some inexplicable reason, all habitats are measured against this standard, including Southern Foredune, Southern Dune Scrub, and Disturbed Dune Scrub/Foredune. Of course these dune habitats do not have features found in a needlegrass grassland/vernal pool complex. Therefore, because of their failure to have vernal pools and associated species, these vegetation classifications are assigned lower habitat values, 0.35 for both Southern Dune Scrub and Disturbed Dune Scrub/Foredune, and 0.45 for Southern Foredune. These values are ludicrous, first because habitat values and "Habitat Units" are supposed to be relevant to individual species, and second because one vegetation type is measured by the features of another. ***The analysis succeeds only in illustrating that dune habitats are not the same as vernal pool/grassland complexes.***

The portion of habitat value deriving from "ecosystem functional integrity" is another wholesale creation of the EIS/R. These standards are not part of HEP, and the choice of standards is arbitrary, with little to do with the sensitive species and vegetation types under analysis. Whether a site is "under regulatory conservation" does not necessarily have anything do with the ecological value of its vegetation type to sensitive species. Similarly, "contiguity with state-designated habitat" is not an ecological criterion. "Variety of pollinator/dispersal mechanisms present" is oriented toward vernal pool habitats, and the choice of "contiguous native habitat >40 acres" is arbitrary. Throughout, the analysis avoids recognition that sensitive plants and wildlife utilize habitats that are not dominated by native species. Loggerhead shrikes forage in ruderal and non-native grasslands as well as in dune scrub. Jackrabbits are thriving in an area with little native plant component. A true HEP would calculate the value of the areas being utilized by carefully selected individual species and use those values to quantify impacts. The EIS/R's "modified" HEP is fatally flawed and must either be revised to follow established procedure, or be abandoned.

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48. EIS/R, p. 4-616.
49. U.S. Fish and Wildlife Service. 1980. Habitat Evaluation Procedures (HEP), 102 ESM.
50. EIS/R, p. 4-615.

3.1.1 Sensitive Vegetation Types

With the exception of the ambiguous treatment of the 100 acres on the northern portion of the El Segundo Dunes, the EIS/R claims not to be proposing direct impacts to sensitive vegetation types. The vegetation types to be removed by the three build alternatives are 306–404 acres of Non-Native Grassland/Ruderal and 60–96 acres of Disturbed/Bare Ground. Although these are not sensitive vegetation types, they are used extensively by sensitive species. Whereas the impacts of removal are to sensitive species, the EIS/R proposes mitigation of abstract "Habitat Units" using the "modified" HEP. The result of the use of the "modified" HEP is to underestimate the effects on the species that use these habitats. The "modified" HEP does not evaluate the value of non-native grassland and disturbed areas to each of the species involved, but rather compares those habitats against an idealized habitat. This allows the EIS/R to state losses and to mitigate in "Habitat Units" instead of acres. ***"Habitat Units" calculated in the HEP do not reflect the value of the habitats to the sensitive species.*** The EIS/R considers these "Habitat Units" as fungible entities, and thereby proposes to mitigate effects to one vegetation type by enhancing another habitat type. Also, by ranking vegetation types on the dunes by comparing them with Valley Needlegrass Grassland/Vernal Pool complex, the EIS/R creates an artificial deficit of "Habitat Units" within the dunes area. The EIS/R then proposes to mitigate for the loss of Non-Native Grassland (occupied by sensitive species) by enhancing the habitat within the already-preserved and restored area of the El Segundo Dunes. If one accepts the logic of the EIS/R's HEP and mitigation scheme, the loss of Non-Native Grassland can be mitigated by making the El Segundo Dunes more like a Valley Needlegrass Grassland/Vernal Pool complex. (The EIS/R actually claims to restore these areas to Southern Dune Scrub, but does not reconcile that the "deficit" in habitat values on the dunes was caused by the "failure" of dune scrub to have vernal pool/grassland characteristics.) So by the twisted logic of the "modified" HEP, the loss of 366–500 acres of vegetation types occupied by sensitive species putatively can be mitigated by "improving" roughly 100 acres already protected as a nature reserve or zoned as such.[51] Because the "modified" HEP does not measure habitat values for the sensitive species involved, the description of impacts in terms of "Habitat Units" will drastically underestimate the impacts to those vegetation types. Again, it must be noted that the procedure used in the EIS/R *has no basis in scientific literature* and resembles the actual HEP in name only.

All alternatives propose the removal of sensitive habitats within the El Segundo Dunes to allow construction of navigational aids. These impacts range from 640–1,344 square feet. While this does constitute a significant impact, it is dwarfed in comparison to the other direct and indirect impacts proposed under the three build alternatives.

The discussion of acreage and "Habitat Units" lost under each alternative is not clear with respect to the Westchester Southside Project. Some impacts from the Westchester Southside Project are included (e.g., loss of mature trees), but the effects of the "Resort Hotels" and golf course/open space development are not discussed. The No Action/No Project Alternative explicitly includes the loss of habitat from the LAX Northside and Continental City projects. As mentioned above, this improperly assumes completion of the LAX Northside Project even though changed conditions should result in reopening of the environmental analysis. Inclusion of these speculative developments as part of the No Project alternative serves only to make the impacts of the Master Plan alternatives appear smaller.

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51. While there are certainly adequate opportunities to enhance the habitat on the El Segundo Dunes through road/infrastructure removal and revegetation, the area available is simply inadequate to compensate for the loss of sensitive species habitat under the three build alternatives.

The EIS/R mentions but does not discuss adequately one impact of the Westchester Southside development: the removal of 300 mature trees that are used as "nursery" sites for raptors.[52] The biological appendix contains no reference to this impact, or the abundance and species of raptors involved.[53] Neither is a description immediately apparent in the "Biological Resources Memoranda for the Record on Floral and Faunal Surveys."[54] The EIS/R should contain a full description of the species of raptors involved, their relative abundance, the location of the trees, and behaviors observed to allow a full evaluation of the impacts.

3.1.2 Sensitive Species

The faulty "modified" HEP results in the underestimation of impacts on sensitive species in the EIS/R. The statement of the impacts to populations are low, which results in improper conclusions about mitigation (see below, Section 4.0).

Lewis' evening primrose (*Camissonia lewisii*). All alternatives acknowledge direct impacts to Lewis' evening primrose. This is expressed in terms of the number of individuals that would be affected. While the number of individuals is important, the area that these individuals occupy is as important to the conservation of the species. However, the map showing the distribution of the species indicates locations only on the El Segundo Dunes west of Pershing Drive. No indication is given of the location of areas occupied east of Pershing Drive, which total 2.5 acres.[55] Populations separated from one another offer some degree of insurance against catastrophic losses at individual sites. The complete geographic distribution of the species at LAX should be provided in the EIS/R.

Belkin's tabanid dune fly (*Brennania belkini*). The EIS/R does not acknowledge the loss of habitat for the Belkin's tabanid dune fly, which is a sensitive species.[56] This species was recorded as present in the "north runway expansion area."[57] The report indicates that the species may disperse into suitable habitat areas. The presence of this dune-associated species and the sensitive Lewis' evening primrose in the north runway expansion area suggests that this area has a substrate suitable for dune obligate species. This may be the result of previous grading, but the value of this site to these and other sensitive species (e.g., potentially El Segundo crab spider, *Ebo* new sp.[58]) should be noted.

San Diego black-tailed jackrabbit (*Lepus californicus bennettii*). The EIS/R acknowledges direct impacts to the habitat of this species, west of the southern runway, east of Pershing Drive. Each of the alternatives would result in the loss of 118.75 acres of occupied area, consisting of the entire population at LAX. The EIS/R maintains that these 118.75 acres equal 14.91 "Habitat Units," or roughly 15 acres of ideal vernal pool/grassland complex. As discussed above, this conversion to "Habitat Units" is misguided and wrong. Only two of the sixteen standards for calculating "Habitat Units" are even remotely related to the value of these areas to black-tailed jackrabbit.

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52. EIS/R, pp. 4-657, 4-658, 4-663.
53. EIS/R, Appendix J1. Biological Assessment Technical Report.
54. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys.
55. EIS/R, p. 4-664.
56. California Department of Fish and Game Natural Diversity Database. 1999. Special Status Plants, Animals and Natural Communities of Los Angeles County. U.S. Fish and Wildlife Service. 1998. *Recovery plan for the El Segundo blue butterfly (Euphilotes battoides allyni)*. U.S. Fish and Wildlife Service, Portland, Oregon, 67 pp.
57. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 213.
58. *Id.* at 209.

Table 1. Relevance of "Modified" Habitat Evaluation Procedure Standards to Two Sensitive Species

HEP Standards	**Relevance to value of area as black-tailed jackrabbit habitat**	**Relevance to value of area as loggerhead shrike habitat**
TOPOGRAPHY		
Mound-depression microrelief	None. Species occurs in a variety of topographic conditions.	None
Native soils w/ slope <10%	None	None
Areas w/ period of inundation ≥ 30 days	None. Can serve as vectors for seed dispersal between vernal pools, but not necessary for habitat.[59]	None
Summer desiccation	None	None
FLORA		
>10% vegetative cover	Some. Forage and cover must be present.	Some. Vegetation must support prey populations.
Native grasses >10%	None. Will forage on all manner of grasses, forbs, and shrubs.[60]	None
Vernal pool associated species	None	None
Listed vernal pool associated species	None	None
FAUNA		
Domination of native fauna (reproducing)	None	None
Grassland associated species (reproducing)	None	None
Sensitive vernal pool associated species	None	None
Listed vernal pool associated species	None	None
ECOSYSTEM FUNCTIONAL INTEGRITY		
Contiguity w/ wetland and State-designated sensitive terrestrial habitat	None	None
Designated sensitive terrestrial habitat	None	None
Under regulatory conservation	None	None
Variety of pollinator/dispersal mechanisms present (wind, wildlife)	None. Is itself a dispersal agent.	None
Contiguous native habitat > 40 acres	Potentially important. Size of habitat, whether native or not, is important.	Potentially important. Size of habitat, whether native or not, is important.

The conversion of occupied area to "Habitat Units," based on the standards listed here, is a misapplication of HEP. The extent of habitat loss to the species is on the order of 119 acres. The use of improperly-defined "Habitat Units" to quantify this loss implies that 15 acres of ideal vernal pool/grassland could support as many black-tailed jackrabbits as 119 acres of non-native grassland.

59. Zedler, P.H., and C. Black. 1992. Seed dispersal by a generalized herbivore: rabbits as dispersal vectors in a semiarid California vernal pool landscape. *The American Midland Naturalist* 128(1):1–10. (Jackrabbits play a similar role in the vernal pool landscape.)
60. Johnson, R.D., and J.E. Anderson. 1984. Diets of black-tailed jack rabbits in relation to population density and vegetation. *Journal of Range Management* 37(1):79–83. MacCracken, J.G., and R.M. Hansen. 1982. Herbaceous vegetation of habitat used by blacktail jackrabbits and Nuttall cottontails in southeastern Idaho. *American Midland Naturalist* 107(1):180–184. Jameson, E.W., Jr., and H.J. Peeters. *California mammals*. Berkeley: University of California Press.

This is not possible; 15 acres is substantially smaller than the smallest recorded home range for the species (256 acres).[61]

Surveys determining the area occupied by black-tailed jackrabbit may underestimate the area currently occupied. Research indicates that jackrabbits may move from 2 to 10 miles during a day, from shrub cover where the species conceals itself during the day, to foraging habitat in the late afternoon and evening.[62] The EIS/R does not provide sufficient survey information to establish if the grasslands and disturbed areas to the west of the southern runways provide only foraging habitat, and whether other locations (e.g., El Segundo Dunes) are already occupied at different times of the day. This is also suggested by studies of home range. In a study of big sagebrush and black greasewood, black-tailed jackrabbit ranges were larger (256–768 acres)[63] than the presumed occupied area at LAX (119 acres). This raises the question whether the species actually occupies a greater area at LAX, especially during the night and crepuscular periods when no surveys were undertaken.

Loggerhead shrike (*Lanius ludovicianus*). The same difficulties found quantifying habitat of black-tailed jackrabbit are found with description of impacts to loggerhead shrike. According to the EIS/R, the species currently occupies 171.86 acres that would be unusable following implementation of any of the project alternatives. (Such precision in habitat quantification is illusory; the EIS/R extrapolates occupied area by vegetation type, providing an *estimate* of habitat area that may differ from the area actually utilized.) Similarly, the EIS/R claims that this impact equals 22.88 "Habitat Units," suggesting that roughly 23 acres of optimum habitat could mitigate for the loss of 172 acres of occupied habitat. This is false, and grossly underestimates the impacts to the species. No data are provided that link vegetation type to shrike density, as would be necessary to support this claim. The HEP standards are no more relevant to loggerhead shrike than they are to black-tailed jackrabbit. Unless an actual Habitat Suitability Index is developed for loggerhead shrike, all discussion of direct impacts should refer to the area of occupied habitat destroyed, not to the hypothetical "Habitat Units." It is furthermore unclear whether the area of the Westchester Southside Project was surveyed, and whether these impacts are included.

Burrowing owl (*Athene cunicularia*). Surveys located burrowing owls within the project boundaries, though found no direct evidence of breeding. The EIS/R claims that the species "was determined not to breed within the Master Plan boundaries."[64] This contradicts the previous assessment made by EIS/R consultant Jim Jennings, who concluded that "there is the potential that they may still breed in the project area."[65] Because burrowing owl densities fluctuate from year to year, burrowing owls were observed in the project area, and potential burrow sites were found, the conservative approach would be to implement measures to ensure the conservation of the species. This species has recently lost much of its local habitat and if extirpated from the project site will disappear from west Los Angeles as a whole.

61. Smith, G.W. 1990. Home range and activity patterns of black-tailed jackrabbits. *Great Basin Naturalist* 50(3):249–256. This study found home ranges of 0.4–1.2 square miles for big sagebrush and black greasewood communities in northern Utah. Many factors may allow higher densities at LAX, such as more forage provided by dense non-native grasses and forbs, but there is no evidence that 15 acres of even the best habitats could compensate for the loss of 119 acres.
62. Dunn, J.P., J.A. Chapman, and R.E. Marsh. 1982. Jackrabbits: *Lepus californicus* and allies. Pp. 124–125 in J.A. Chapman, and G.A. Feldhamer (eds.). *Wild mammals of North America: biology, management and economics.* Baltimore: The Johns Hopkins University Press.
63. Smith, G.W. 1990. Home range and activity patterns of black-tailed jackrabbits. *Great Basin Naturalist* 50(3):249–256.
64. EIS/R, Tables 4.10-2, 4-630.
65. EIS/R, Technical Report 7. Biological Resources Memoranda for the Record on Floral and Faunal Surveys, p. 463.

Western spadefoot toad (*Spea hammondi*). The EIS/R reports that the proposed project alternatives will destroy four seasonal ponds occupied by western spadefoot toads on the south airfield.[66] These populations number at least several hundred adults and all would be destroyed by the various project alternatives. The EIS/R estimates occupied area as 8.97 acres of ephemerally wetted areas and adjacent upland habitats. Spadefoot toads require upland habitats surrounding their aquatic habitat.[67] It is unclear how this area was determined for the EIS/R. Critically important in the analysis is that the species is found in four separate areas. Even though the areas are close to each other, the existing configuration of habitat patches is important to reduce risk to the species from a catastrophic event (e.g., chemical spill, disease). Depending on the separation of the pools, there may still be genetic exchange among the populations in each. These risk dynamics should be considered when evaluating the impact on the species and potential mitigation measures. Loss of the LAX population of western spadefoot toad would cause a significant restriction of the range of the species.

Riverside fairy shrimp (*Branchinecta sandiegoensis*). LAX represents the only known coastal population of Riverside fairy shrimp in Los Angeles County. Loss of this population, which is spread among nine sites on the western portion of the property, would be a significant impact. The EIS/R asserts that because the sites where fairy shrimp cysts were found do not have characteristic vernal pool plants, no suitable habitat is found for the species. This conclusion is false — fairy shrimp require vernal pool hydrology, not vernal pool plants, for their existence. This condition would exist, were the management practices at LAX to remove standing water in these pools. It is indeed LAWA's own management scheme that prevents Riverside fairy shrimp from completing its life cycle; LAWA, therefore, should incur liability for "take" of the species under the Endangered Species Act. LAWA fails to recognize that once the presence of fairy shrimp cysts was detected in the vernal pools at LAX, the airport should have ceased its activities that inhibited the life cycle of the species. Instead, the proposal is to destroy all of the areas currently occupied.

The description of acreage for this species does not seem to include the size of the cachements necessary to fill the "ephemerally wetted areas." These areas are necessary to formulate appropriate mitigation measures and evaluate impacts.

The EIS/R is insistent that "there are no extant vernal pools within the [Airport Operations Area]."[68] This statement is meant within the definition of vernal pools as a vegetation type. However, the term "vernal pool" may be used to refer to pools with standing water during the winter and spring, regardless of the presence of certain plant species. As defined by the U.S. Fish and Wildlife Service, "a vernal pool is a natural habitat of the Mediterranean climate region of the Pacific coast covered by shallow water for extended periods during the cool season but completely dry for most of the warm season drought."[69] The definition of the term is hydrological, not botanical. The EIS/R should therefore explicitly disclose that the statement "no vernal pools" refers to a botanical definition. Given the near complete destruction of vernal pools in Los Angeles County,[70] even loss of sites with vernal pool

66. *Id.* at 248.
67. Ruibal, R., L. Trevis, and V. Roig. 1969. The terrestrial ecology of the spadefoot toad *Scaphiopus hammondii*. *Copeia* 572–584.
68. EIS/R, p. 4-691.
69. Zedler, P.H. 1987. *The ecology of southern California vernal pools: a community profile*. U.S. Fish and Wildlife Service Biological Report 85(7.11), p 1.
70. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles Coastal Prairie, a vanished community. *Crossosoma* 26(2):71–102.

hydrology and any remnant species (plant or invertebrate) represents a significant impact. The EIS/R emphasizes that Riverside fairy shrimp habitat is degraded through the presence of exotic plant species, presumably to suggest how much better mitigation sites will be than current conditions. However, the degradation of the habitat by exotic plant species is irrelevant to the quality of the pool as habitat for Riverside fairy shrimp. Other degradation to the habitat results directly from LAWA's management;[71] this degradation is avoidable.

3.2 Indirect Impacts

As a whole, indirect impacts are not well described in the EIS/R. Those that are described are dismissed with little or no data offered in support, leaving the probability of much greater indirect impacts from the project alternatives than those disclosed.

3.2.1 Light

Night lighting has an effect on bird species composition in an area. A study in Sacramento showed that American crows (*Corvus brachyrhynchos*) roost in areas with high nighttime lighting levels.[72] It is hypothesized that artificial lighting allows them to reduce predation from owls.[73] Crows are native, but they are also aggressive, and artificially increased population levels can be detrimental to other native bird species, including such sensitive species as loggerhead shrike. Artificial night lighting has also been shown to affect the behavior of nocturnal frogs, reducing their visual acuity and ability to consume prey, an impact that may befall those amphibians found within Master Plan boundaries.[74] Many larval forms of arthropods are positively phototactic (e.g., attracted to light, even artificial light), which poses a threat to the many sensitive insect species found on the El Segundo Dunes.[75] Artificial lighting results in increased mortality of moths and other nocturnal insects.[76] Night lighting can also affect kestrels as seen from observation of lesser kestrel (*Falco naumanni*), but also applicable to American kestrel (*Falco sparverius*), found on the El Segundo Dunes.[77] In fact, artificial night lighting affects singing and foraging time of many bird species.[78] Increased lighting even affects gastropods, which would include the sensitive Trask's snail (*Helminthoglypta traskii*).[79]

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71. EIS/R, p. 4-699.
72. Gorenzel, W.P., and T.P. Salmon. 1995. Characteristics of American Crow urban roosts in California. *Journal of Wildlife Management* 59(4):638–645.
73. Brody, J.E. 1997. The too-common crow is getting too close for comfort. *New York Times*, May 27.
74. Buchanan, B.W. 1993. Effects of enhanced lighting on the behaviour of nocturnal frogs. *Animal Behaviour* 45(5):893–899.
75. Summers, C.G. 1997. Phototactic behavior of *Bemisia argentifolii* (Homoptera: Aleyrodidae) crawlers. *Annals of the Entomological Society of America* 90(3):372–379.
76. Frank, K.D. 1988. Impact of outdoor lighting on moths: an assessment. *Journal of the Lepidopterists' Society* 42(2):63–93. Kolligs, D. 2000. Ecological effects of artificial light sources on nocturnally active insects, in particular on butterflies (Lepidoptera). *Faunistisch-Oekologische Mitteilungen* Supplement(28):1–136.
77. Negro, J.J., J. Bustamante, C. Melguizo, J.L. Ruiz, and J.M. Grande. 2000. Nocturnal activity of Lesser Kestrels under artificial lighting conditions in Seville, Spain. *Journal of Raptor Research* 34(4):327–329.
78. Outen, A. 1998. *The possible ecological implication of artificial lighting*. Hertfordshire, UK: Hertfordshire Biological Records Centre. Bergen, F., and M. Abs. 1997. Etho-ecological study of the singing activity of the blue tit (*Parus caeruleus*), great tit (*Parus major*) and chaffinch (*Fringilla coelebs*). *Journal fuer Ornithologie* 138(4):451–467. Derrickson, K.C. 1988. Variation in repertoire presentation in northern mockingbirds. *Condor* 90(3):592–606. Hoetker, H. 1999. What determines the time-activity budgets of avocets (*Recurvirostra avosetta*)? *Journal fuer Ornithologie* 140(1):57–71. Frey, J.K. 1993. Nocturnal foraging by Scissor-Tailed Flycatchers under artificial light. *Western Birds*

(cont'd)

These effects may seem to be relatively innocuous, except that species that extend their activity periods into nighttime are often exposed to drastically increased predation threats. In a study of butterfly larvae, a higher growth rate associated with longer photoperiod (as would be caused by artificial light) resulted in significantly higher predation on the butterfly larvae from the primary parasitoid species.[80] Similar tradeoffs will likely occur for the El Segundo blue butterfly with increased lighting on the El Segundo Dunes. While the increased light may increase larval development, the time of activity may also increase predation and parasitism.

The conclusion in the EIS/R that the increased levels of night lighting will have no effect on the El Segundo blue butterfly is completely unsupported by current scientific knowledge of the mechanisms of such effects on ecological systems. The EIS/R concentrates on the adult form of the El Segundo blue butterfly, which only constitutes a minute fraction of the lifecycle of the organism, and ignores published scientific literature documenting the tradeoffs of increased lighting on larval forms of butterflies. Furthermore, the EIS/R includes no discussion of bat species that may forage on the El Segundo Dunes. Many bat species found in Los Angeles County are considered sensitive species, and their foraging patterns are affected by lighting levels. Some faster-flying species congregate at streetlights, while slower-flying species avoid them.[81] The EIS/R should document the bat species foraging within the project site and evaluate the impacts of lighting and other development on them.

The increased nighttime light levels on the El Segundo Dunes constitute a significant adverse impact, and should be avoided. One method to decrease the impacts of nighttime lighting is to use low pressure sodium lamps in place of other lighting types. Yellow light from these sources has less ecological impact. Other possible mitigation measures include using full cut-off lighting fixtures and mandating operational controls.

3.2.2 Noise

The effects of airport noise on the fauna of the project area are not considered at all. Perhaps this results from the noise analysis, which improperly chooses 1996 — prior to the introduction of quieter airplanes — as the baseline for noise impacts, rather than what noise conditions would be in the absence of the proposed project. Through this careful choice of baseline, the EIS/R argues that there would be virtually no change in the noise levels on the El Segundo Dunes. However, this is not the case. Noise would be more constant under increased passenger capacity — more planes would be traveling in and out of the airport. Increased noise levels on the El Segundo Dunes will have significant adverse effects on the wildlife found there, effects that are evident from the available scientific literature.

The use of a weighted average to describe noise levels (CNEL) precludes and obfuscates analysis of actual noise impacts. From the standpoint of wildlife, and indeed human physiological responses, it is relevant to know what maximum noise levels are experienced, and at what duration. While the average noise levels described in the EIS/R offer some indication of which areas are louder than others,

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24(3):200. Hill, D. 1992. *The impact of noise and artificial light on waterfowl behavior: a review and synthesis of available literature*. British Trust for Ornithology Research Report No. 61.

79. Lamiot, F. 1998. Impacts écologiques de l'éclairage nocturne. Premier Congrès européen sur la protection du ciel nocturne, June 30–May 1, Paris.
80. Gotthard, K. 2000. Increased risk of predation as a cost of high growth rate: an experimental test in a butterfly. *Journal of Animal Ecology* 69(5):896–902.
81. Rydell, J., and H.J. Baagoe. 1996. Bats & streetlamps. *Bats* 14(4):10–13.

maximum noise levels are necessary to evaluate potential hearing loss, startle reactions in animals, barriers to vocal communication, and other significant impacts to the fauna of the El Segundo Dunes.

The body of research on the effects of noise on vertebrates shows that chronic noise, even at low levels, is associated with elevated stress hormone levels, higher blood pressure, faster heart rates, and other physiological effects.[82] As a result, birds, mammals and other vertebrates may show anatomical differences (smaller body size, enlarged adrenal glands) from prolonged exposure to noise. Species that use vocalizations to communicate may be excluded altogether from noisy areas. The effects of noise on birds and mammals in particular are relevant to the EIS/R.

Birds. Of 45 bird species investigated in woodlands in The Netherlands, 33 showed significantly depressed breeding density in response to increased noise levels near roads. All species in the small passerine families Sylviidae, Fringillidae, and Emberizidae were affected by noise.[83] This research also showed that noise effects followed a threshold model.[84] This means that up to a certain noise level, no decrease in density is observed. When noise increases beyond that threshold level, bird density decreases dramatically in the area between the location at which that threshold is met and the road. The decreased density over the area with noise greater than the threshold level ranges from 30% to 100% and is known as the "decrease factor."[85]

These two variables, the threshold value and the decrease factor, describe the impact of noise on breeding birds. Empirical measurement of the threshold value in woodlands shows that for all bird species combined the threshold value is 42–52 dB(A), with individual species exhibiting thresholds as low as 36 dB(A) and as high as 58 dB(A).[86] Furthermore, years with overall low population densities showed lower threshold levels.

Similar research has been conducted for grasslands. Overall, this research shows that breeding bird habitat is degraded at noise levels as low as 36 dB(A). Minimum noise levels on the El Segundo Dunes are 70 dB(A) CNEL,[87] a quantification that does not even provide maximum noise levels. There is no question therefore that noise from LAX operations affects breeding bird densities on the El Segundo Dunes.

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82. Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colorado. NERC-88/29. 88 pp. Such effects are found in humans too; children exposed to chronic noise greater than 60 dB "experienced marginally higher resting systolic blood pressure, greater heart rate reactivity to test, and higher overnight cortisol levels, which are signs of modestly elevated physiological stress" (Environmental News Network. 24 May 2001. Noisy neighborhoods harmful to childrens' health).
83. Reijnen, R., R. Foppen, and G. Veenbaas. 1997. Disturbance by traffic of breeding birds: evaluation of the effect and considerations in planning and managing road corridors. *Biodiversity and Conservation* 6:567–581.
84. Reijnen, R., R. Foppen, C. ter Braak, and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32:187–202.
85. *Id.* at 192.
86. Reijnen, R., R. Foppen, C. ter Braak, and J. Thissen. 1995. The effects of car traffic on breeding bird populations in woodland. III. Reduction of density in relation to the proximity of main roads. *Journal of Applied Ecology* 32:187–202. Reijnen, R., and R. Foppen. 1995. The effects of car traffic on breeding bird populations in woodland. IV. Influence of population size on the reduction of density close to a highway. *Journal of Applied Ecology* 32:481–491. Reijnen, R., R. Foppen, and H. Meeuwsen. 1996. The effects of traffic on the density of breeding birds in Dutch agricultural grasslands. *Biological Conservation* 75:255–260.
87. EIS/R, Figures 4.2-15, 4.2-19, 4.2-23.

Mammals. Chronic noise is a problem for native mammals on the El Segundo Dunes, as it is for humans in surrounding neighborhoods. The description of one study on the effect of airport noise on a small mammal illustrates one example of this problem:

> Only a few studies of the physiological effects of noise on rodents have involved wild animals. A field study by Chesser et al. (1975) involved two populations of house mice near the end of a runway at Memphis International Airport. Adult mice also were collected from a rural field 2.0 km from the airport field. Background noise levels at both fields were 80–85 dB. Noise levels of incoming and outgoing aircraft at the airport field averaged 110 dB, with the highest reading reaching 120 dB. Total body weights and adrenal gland weights of mice from the fields were measured. Additional mice were captured from the rural field, placed in the laboratory, and exposed to 1 minute of 105-dB recorded jet aircraft noise every 6 minutes to determine if noise was the causative factor. Control mice were not subjected to noise. After 2 weeks, the adrenals were removed and weighed. Adrenal gland weights of male and female mice from the airport field were significantly greater than those of mice from the rural field. The noise-exposed mice in the laboratory study had significantly greater adrenal gland weights than the control mice. After ruling out stress factors, such as population density, Chesser et al. (1975) concluded that noise was the dominant stressful factor causing the adrenal weight differences between the two feral populations.[88]

While house mice are of no regulatory concern, native mammals on the El Segundo Dunes include some native small mammals (harvest mouse, *Reithrodontomys megalotis*, desert wood rat, *Neotoma lepida*) which are locally significant. Impacts of noise to the habitat quality of the El Segundo Dunes for native mammals should be evaluated.

Reptiles and Amphibians. Spadefoot toads may be induced to emerge from their burrows in response to loud noises (95 dB(A) recordings of motorcycle noise in one experiment).[89] Fringe-toed lizards are rendered deaf after 9 minutes exposure to 95 dB(A) noise in the same study. Some snakes will show alert behavior in response to airplanes flying overhead.[90]

The EIS/R should evaluate the effects of noise on the biota of the El Segundo Dunes. It is likely that if the noise baseline were set at current conditions rather than before the implementation of quieter planes, this analysis would reveal significant impacts on the ability of the El Segundo Dunes to support populations of some species of birds, mammals, and other vertebrates. Such significant impacts should be identified and mitigated.

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88. Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cavendish. 1988. Effects of aircraft noise and sonic booms on domestic animals and wildlife: a literature synthesis. U.S. Fish and Wildlife Service National Ecology Research Center, Ft. Collins, Colorado. NERC-88/29. 88 pp.
89. Brattstrom, B.H., and M.C. Bondello. 1983. Effects of off-road vehicle noise on desert vertebrates. Pp. 167–206 in R.H. Webb and H.G. Wilshore, eds. *Environmental effects of off-road vehicles. Impacts and management in arid regions.* New York: Springer-Verlag.
90. Yahya, S.A. 1978. Hearing ability of brown tree snake (*Oendrelaphis tristis*). *Journal of the Bombay Natural History Society* 75:930–931.

3.2.3 Pollution

The discussion in the EIS/R about pollution effects on the El Segundo blue butterfly deserves comment. The EIS/R makes the statement, "Monitoring results indicate that current levels of vanadium are not adversely affecting the El Segundo blue butterfly population at the Habitat Restoration Area since counts for the year 2000 showed a significant increase in the population when compared to 1999."[91] Many factors influence butterfly abundance from year to year; changes from 1999 to 2000 provide no information about the effect of pollution on the butterfly. This statement is indicative of a fundamental misunderstanding of the process of deductive reasoning. The reality is that we have no idea what effect pollution has on the populations of sensitive species on the El Segundo Dunes, including the El Segundo blue butterfly. Population trends cannot be derived from two years of data, and are even difficult with ten years of measurements.[92]

3.2.4 Landscaping

The EIS/R does not asses the detrimental impacts of landscaping adjacent to the El Segundo Dunes. LAWA has planted invasive exotic species as landscape plants in the past, resulting in a greater load of exotic seed rain on the El Segundo Dunes.[93] Exotic landscaping material, and associated irrigation, can cause significant adverse effects on the biological resources of the El Segundo Dunes.

Installation of permanent irrigation in new areas along Pershing Drive would result in an expansion of the invasive exotic arthropod community on the El Segundo Dunes. Water sources promote population increases of non-native Argentine ants (*Linepithema humile*), European earwigs (*Forficula auricularia*), and other exotic species, which displace native insect species, an effect that has recently been documented to extend 200 m into native habitats.[94] Argentine ants are found on the El Segundo Dunes already, but the explosion in numbers associated with permanent irrigation will wreak havoc on native arthropod communities. This is shown by consistent decreases in native arthropod diversity in response to increased Argentine ant abundance.[95] Argentine ants would displace native ants surrounding the project site. This extirpation reverberates up the food chain, as some native reptiles (e.g., coast horned

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91. EIS/R, Appendix J1. Biological Assessment Technical Report, p. 91.
92. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452.
93. Kowsky, K. 24 April 1995. Plant-life dispute blooms at airport; environmentalist sees exotic plants at LAX as threat to survival of endangered butterfly. *Los Angeles Times*, B-1. Gregor, I. 1 April 2000. Seeds of trouble: airport landscaping project has environmental groups up in arms. *Daily Breeze*, B-1.
94. Holway, D.A. 1998. Factors governing rate of invasion: a natural experiment using Argentine ants. *Oecologia* 115(1-2):206–212. Suarez, A.V., D.T. Bogler, and T.J. Case. 1998. Effects of fragmentation and invasion on native ant communities in coastal southern California. *Ecology* 79(6):2041–2056.
95. Erickson, J.M. 1971. The displacement of native ant species by the introduced Argentine ant *Iridomyrmex humilis* (Mayr). *Psyche* 78:257–266. Cole, B.J. 1983. Assembly of mangrove ant communities: patterns of geographic distribution. *Journal of Animal Ecology* 52:339–348. Human, K.G., and D.M. Gordon. 1996. Exploitation and interference competition between the invasive Argentine ant, *Linepithema humile*, and native ant species. *Oecologica* 105(3):405–412. Human, K.G., and D.M. Gordon. 1997. Effects of Argentine ants on invertebrate biodiversity in Northern California. *Conservation Biology* 11(5):1242–1248. Holway, D.A. 1998. Effect of Argentine ant invasions on ground-dwelling arthropods in northern California riparian woodlands. *Oecologia* 116(1-2):252–258. Kennedy, T.A. 1998. Patterns of an invasion by Argentine ants (*Linepithema humile*) in a riparian corridor and its effects on ant diversity. *American Midland Naturalist* 140(2):343–350. Longcore, T.R. 1999. Terrestrial arthropods as indicators of restoration success in coastal sage scrub. Ph.D. Thesis, Department of Geography, University of California, Los Angeles.

lizard, *Phrynosoma coronatum*, found on the El Segundo Dunes) preferentially feed on native ants and decline in their absence.[96]

The EIS/R should require as a mitigation measure that in areas adjacent to the El Segundo Dunes, all landscaping plants be limited to locally native species, and that irrigation be limited to winter only.

3.3 Cumulative Impacts

The analysis of cumulative impacts is woefully inadequate and is inconsistent with previous conclusions reached by the City of Los Angeles in environmental impact reports. The discussion of cumulative impacts in Sections 4.10 and 4.11 of the EIS/R consists of a description of the Master Plan area and the following statement:

> Areas surrounding the study area consist largely of developed areas with little or no habitat value. However, two biologically significant open spaces, the Ballona Wetlands and the Ballona Bluffs, remain extant within the vicinity of the study area.[97]

However, in the Final Environmental Impact Report for the West Bluffs Project — a project to build residences on the last open space on the Ballona Bluffs — the City of Los Angeles found:

> The contribution of the proposed project to impacts on plant and animal life from ongoing development in the region is not considered to be significant, due to the disturbed nature and correspondingly low resource value of the project site.[98]

The current EIS/R is inconsistent with the above statement. To the contrary, the current EIS/R states that:

> The cumulative impacts on biotic communities from development of the LAX Master Plan Improvements, and other proposed projects in the area, most notably the Playa Vista Master Plan Project and the Catellus residential proposal on the Ballona Bluffs, are considered significant due to the limited amount of extant natural habitat in the vicinity of the study area, particularly wetlands.[99]

The EIS/R then argues that implementation of the LAX Master Plan will not contribute to these cumulative impacts. The City of Los Angeles seems to claim that whichever project is under review does not contribute to cumulative impacts, yet once approved, the City's subsequent environmental review documents acknowledge that projects did contribute to cumulative impacts. The reality is that both the Catellus West Bluffs Project and the LAX Master Plan will contribute to significant cumulative impacts on natural resources.

Upland foraging habitat for grassland songbirds and raptors will be nearly eliminated by the combination of the LAX Master Plan, the West Bluffs Project, Playa Vista Phase I, and the potential

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96. Suarez, A.V., J.Q. Richmond, and T.J. Case. 2000. Prey selection in horned lizards following the invasion of Argentine ants in southern California. *Ecological Applications* 10:711–725.
97. EIS/R, pp. 4-663, 4-706.
98. City of Los Angeles. October 1998. EIR No. 91-0675. West Bluffs Project Section IV.D.3.
99. EIS/R, p. 4-664.

Playa Vista Phase II. The Ballona Creek watershed (with the exception of the Baldwin Hills) will no longer support many bird species as a result of the cumulative impacts of these developments. Western meadowlark, white-tailed kite, California horned lark, loggerhead shrike, sharp-shinned hawk, northern harrier, Cooper's hawk, and American kestrel will experience significant declines in suitable habitat as a result of these cumulative impacts. Peregrine falcon will experience significant losses of foraging habitat. Many birds associated with the Ballona Wetlands forage in upland habitats, especially during the winter and spring rains. For example, great blue heron and snowy egret forage in the ephemeral wetlands at LAX and the West Bluffs site. If all of these projects are completed, all remnants of vernal pools in the northern portion of the former Los Angeles Coastal Prairie will be obliterated. Vernal pool hydrology at the West Bluffs site and at LAX would be destroyed, yet the EIS/R claims that no significant cumulative impacts will result from the project.

This is the end of the line for open space in west Los Angeles. The City of Los Angeles must recognize that the current project, plus the others previously approved by the City, have significant, irreversible, cumulative impacts on biological resources.

4.0 Mitigation Measures

The mitigation measures that rely on the "modified Habitat Evaluation Procedure" are insufficient to offset the significant impacts that would result from the build alternatives. The use of "Habitat Units" in mitigation measures MM-BC-2, MM-BC-4, MM-BC-5, MM-BC-6, and MM-BC-7 is fundamentally flawed.

The all-purpose mitigation measure "Conservation of Faunal Resources" (MM-BC-4) is completely inadequate to address impacts to sensitive species from the project alternatives. The conversion to "Habitat Units" is spurious; all mitigation must replace lost habitat with an equal or greater area.

4.1 Lewis' Evening Primrose

Mitigation for Lewis' evening primrose does not ensure that a replacement population of the species will be created, only that more individuals will be grown on the El Segundo Dunes, where the species is already found. In addition to establishing a numerical goal for the number of individuals to be replaced, mitigation should ensure the area occupied by the species will increase by at least the 2.5 acres that would be lost. Because there is a risk-spreading benefit in the disjunct configuration of the impacted population, the mitigation site should be geographically distinct from currently occupied sites.

4.2 Western Spadefoot Toad

Mitigation for the western spadefoot toad ignores the geographic configuration of the impacted population(s). These toads are found in four distinct ephemerally wet areas on the LAX property, all of which would be destroyed by the build alternatives. Division of the population into separate, hydrologically distinct pools with different cachements is a benefit to the population. Mitigation for these losses cannot be achieved through creation of 1.24 acres of ideal habitat (the "Habitat Units"), but rather must consist of four separate pools and associated cachements of at least 9 acres.

The choice of mitigation location is important as well. The top choice would be on the areas of the former Los Angeles Coastal Prairie west of Pershing Drive. However, the EIS/R claims that allowing a vernal pool in this area would encourage bird life as well, and would therefore pose a hazard to aircraft.

If off-site mitigation is necessary, the first choice should be the West Bluffs property, currently subject to development by the Catellus Corporation. The West Bluffs site has vernal pool hydrology and is the only candidate site within a reasonable distance of LAX. Distant sites such as Madrona Marsh and potentially California State University Dominguez Hills (where spadefoot toads possibly persist in a vernal pool but are subject to imminent extirpation from construction), should be utilized only in addition to a more proximate site. If no proximate sites are secured (e.g., the West Bluffs property is unobtainable), then the conclusion of the EIS/R must be that the impacts to the species cannot be mitigated to a less than significant level. Without the LAX population, or a possible West Bluffs replacement, the range of the species in the region will be significantly diminished, even with more distant offsite mitigation.

4.3 Riverside Fairy Shrimp

A similar analysis applies to the proposed mitigation for the loss of habitat for the Riverside fairy shrimp. The species is currently found in at least nine areas affected by the build alternatives. The proposed mitigation is for "no more" than 1.3 acres of replacement habitat.[100] To the contrary, loss of this occupied habitat should be mitigated by provision of nine pools with associated upland cachement areas to support vernal pool hydrology. While the mitigation measure suggests one location with 0.75 habitat value (i.e. restoration of vernal pool plants and other vernal pool characteristics), it is more important to the fairy shrimp that multiple locations be acquired. Population models for species found in habitat patches (e.g., metapopulations) show that persistence is enhanced not by density at a single site — although patch size is important — but by maximizing the number of occupied patches.[101] To trade occupied sites for other biological values such as presence of sensitive plant species decreases the long-term persistence possibilities for the fairy shrimp. Certainly full vernal pool restoration would be a noble conservation goal, but it does not mitigate the impacts to the Riverside fairy shrimp. The potential mitigation sites should be chosen by proximity to LAX. The West Bluffs site could provide one, possibly two pools. Additional pools should be identified to mitigate fully the impacts to the species.

4.4 San Diego Black-tailed Jackrabbit

As discussed above, the proposed mitigation for the San Diego black-tailed jackrabbit is insufficient to offset the losses to the species. The loss of 119 acres of occupied habitat must be offset by the provision of at least 119 acres of additional habitat. The EIS/R provides no evidence to show that the species can be supported at similar densities in the Habitat Restoration Area on the dunes, nor that the "Habitat Units" of restoration on the dunes will make the area more suitable for jackrabbits. Black-tailed jackrabbits require mixed grasses, forbs, and shrubs for food; dune scrub may provide less preferred forage than exotic grassland. The Habitat Restoration Area therefore may support lower densities of the species than currently occupy the 119 acres of exotic grassland. Furthermore, the EIS/R provides no estimate of the size of the population to be impacted, or the diel[102] patterns of movement exhibited by the species, information that is necessary to formulate an effective mitigation measure. Any release program on the El Segundo Dunes must be accompanied by a humane control program for the exotic red fox (*Vulpes vulpes*).

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100. EIS/R, p. 4-708.
101. Hanski, I. 2000. *Metapopulation ecology*. London: Oxford University Press.
102. "Diel" refers to a 24-hour period, a full day and night.

4.5 Loggerhead Shrike

The EIS/R proposes to mitigate for loss of occupied loggerhead shrike habitat (172 acres) with restoration on the El Segundo Dunes in the form of 22.88 "Habitat Units." Implicit in this proposal is the assumption that the density of loggerhead shrikes on the El Segundo Dunes can be increased to accommodate those displaced by the loss of 172 acres of occupied habitat. The EIS/R provides no information about densities of loggerhead shrike to support this implicit assumption. To the contrary, because the El Segundo Dunes are already occupied with breeding loggerhead shrikes, and the shrike's use of habitat is not tied to whether the vegetation is native or not (or to the arbitrary habitat standards of the HEP), restoration on the El Segundo Dunes is not likely to appreciably increase the density of shrikes found there. Mitigation for this impact must be found elsewhere, in the form of 172 acres of shrike habitat. Loggerhead shrike are found at the West Bluffs site, but the site is only 44 acres and so could only offer partial mitigation for impacts at LAX. Other additional mitigation sites include properties covered under the Playa Vista master plan, or in the Baldwin Hills. However, if 172 acres of shrike habitat in addition to the El Segundo Dunes cannot be identified and acquired as mitigation, then the significant impact to this species cannot be mitigated to a less than significant level. The impacts are certainly not mitigated by the proposal to provide 23 extra "Habitat Units" in currently occupied habitat.

4.6 Los Angeles Coastal Prairie

Prescriptions for restoration of Valley Needlegrass Grassland described in MM-BC-5, MM-BC-6, and MM-BC-7 are not consistent with evidence of the historic vegetation in the area, which Mattoni and Longcore have described as Los Angeles Coastal Prairie. The prescription is for a needlegrass dominated habitat, with four common subshrubs. First, five plant species are insufficient to restore this habitat type; the actual plant diversity of the habitat was significantly higher. Second, the relative abundance of species is nothing approaching historical conditions. A transect along a historic photograph of the Coastal Prairie (or "meadow" as described by Pierce[103]), shows the following coverage: *Lupinus bicolor* (39%), *Camissonia bistorta* (18%), *Phacelia stellaris* (14%), *Lotus strigosus* (8%), *Festuca megalura* (4%), *Cryptantha intermedia* (1%), and open (16%).[104] A mitigation measure should bear at least some resemblance to the vegetation type that it proposes to emulate. Furthermore, the standard of 10% native cover for successful restoration is outrageous. The claim that this is defensible because 10% is deemed significant for the identification of a native grassland by the California Department of Fish and Game is equally stunning. Ten percent cover represents the most degraded grasslands, not a standard to achieve in restoration. If the success criterion for grassland mitigation were followed, the vegetation created would score very low on the "modified" HEP touted in the EIS/R.

4.7 Restoration Performance Criteria

The performance criteria for the restoration efforts are all exceedingly weak. The only quantifiable standard for revegetation performance is attainment of native cover, the highest of which is 45%. Ecologists have developed many measures of habitat quality that are be available to define performance

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103. Pierce, W.D. 1938. The fauna and flora of the El Segundo sand dunes: 1. General ecology of the dunes. *Bulletin of the Southern California Academy of Sciences* 37(3):93–97.
104. Mattoni, R., and T.R. Longcore. 1997. The Los Angeles Coastal Prairie, a vanished community. *Crossosoma* 26(2):71–102, at 87.

standards for revegetation, including many measures of plant diversity and plant structure.[105] Wetland mitigation must meet stringent standards quantifying wetland functions and values.[106] Terrestrial arthropods have been used to assess the performance of revegetation in re-creating native habitats.[107] The performance criteria for restoration should provide more ecological information than simply percent native cover, especially when so many measures are readily available. Without true ecological assessment of restored areas, the success of the mitigation will be forever unknown.

4.8 Raptor "Nursery Sites"

Insufficient information about the impact to raptors using mature trees is provided to allow assessment of whether the mitigation measure (MM-BC-3) would be effective for replacement of mature trees. The location of this mitigation would be important, and the destruction of nearly all of the open space used for foraging by raptors may render "nursery sites" extraneous, with no raptors to use them.

5.0 California Coastal Act

None of the build alternatives in the Master Plan would be consistent with the California Coastal Act. First, there would be many impacts to the environmentally sensitive habitat area on the El Segundo Dunes through the indirect effects of increased construction, light, landscaping, pollution, and road construction. The mitigation measures proposed are insufficient to mitigate for these significant disruptions of habitat values. Even though the development is designed to occur outside the coastal zone boundary, Section 30240(b) of the Coastal Act provides that:

> Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.[108]

Second, the EIS/R does not discuss impacts to marine biological resources, which could occur as a result of runoff into and jet fuel dumping over the ocean. Impacts to marine biological resources should be described and appropriate changes implemented before preparation of a final EIS/R.

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105. Magurran, A.E. 1988. *Biological diversity and its measurement.* Princeton: Princeton University Press, 179 pp.
106. Rheinhardt, R.D., M.M. Brinson, and P.M. Farley. 1997. Applying wetland reference data to functional assessment, mitigation, and restoration. *Wetlands* 17(2):195–215.
107. Mattoni, R., T. Longcore, and V. Novotny. 2000. Arthropod monitoring for fine scale habitat analysis: a case study of the El Segundo dunes. *Environmental Management* 25(4):445–452. Bisevac, L., and J.D. Majer. 1999. Comparative study of ant communities of rehabilitated mineral sand mines and heathland, Western Australia. *Restoration Ecology* 7(2):117–126. Holl, K.D. 1996. The effect of coal surface mine reclamation on diurnal lepidopteran conservation. *Journal of Applied Ecology* 33(2):225–236. Longcore, T.R. 1999. Terrestrial arthropods as indicators of restoration success in coastal sage scrub. Ph.D. Thesis, Department of Geography, University of California, Los Angeles. Parmenter, R.R., and J.A. Macmahon. 1987. Early successional patterns of arthropod recolonization on reclaimed strip mines in southwestern Wyoming [USA]: the ground-dwelling beetle fauna (Coleoptera). *Environmental Entomology* 16(1):168–177. Wheater, C.P., W.R. Cullen, and J.R. Bell. 2000. Spider communities as tools in monitoring reclaimed limestone quarry landforms. *Landscape Ecology* 15(5):401–406. Williams, K.S. 1993. Use of terrestrial arthropods to evaluate restored riparian woodlands. *Restoration Ecology* 1:107–116. Williams, K.S. 1997. Terrestrial arthropods as ecological indicators of habitat restoration in southwestern North America. Pp. 238–258 in K.M.N.R.W. Urbanska and P.J. Edwards (eds.). *Restoration ecology and sustainable development; First International Conference, Zurich, Switzerland.* Cambridge: Cambridge University Press.
108. California Public Resources Code § 30240(b).

6.0 Conclusion

The EIS/R treatment of biological resources represents the result of significant effort and expenditure on the part of the preparers. Unfortunately, the resulting analysis is deeply flawed, unscientific, and improperly reaches the conclusion that the mitigation measures would reduce impacts to a less than significant level. To the contrary, implementation of any of the three build alternatives would be catastrophic for the biological resources on the project site and result in a significant local and cumulative impact on sensitive species. If approved and implemented, the Master Plan will permanently degrade the diversity and abundance of native wildlife in west Los Angeles. The last refuges of birds and mammals depending on large open spaces will be erased from the landscape.

Appendix B

Qualifications of Travis Longcore and Catherine Rich

Travis Longcore

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Los Angeles, California 90024-0020
Telephone: (310) 247-9719

Education

Ph.D., Geography, University of California, Los Angeles 1995–1999

Dissertation Title: *Terrestrial Arthropods as Indicators of Restoration Success in Coastal Sage Scrub*

M. A., Geography, University of California, Los Angeles 1993–1995

Thesis Title: *Risk, Technology, and Place: Siting a Radioactive Waste Dump in California's Ward Valley*

Honors B. A., Geography *summa cum laude,* University of Delaware 1989–1993

Thesis Title: *Information Technology and World City Restructuring: The Case of New York City's Financial District*

Professional Experience

Research Assistant Professor, Center for Sustainable Cities, Department of Geography, University of Southern California 2001–present

Lecturer, UCLA Department of Geography, UCLA Department of Organismic Biology, Ecology and Evolution, UCLA Institute of the Environment 2000–present

Lower division: Biogeography, People and the Earth's Ecosystems, Ecology and Conservation of California Oaks. Upper division: World Vegetation, Forest Ecosystems, Ecology, Environmental Impact Analysis.

Co-founder and Science Director, The Urban Wildlands Group 1996–present

Organization studies and works to protect species, habitats, and ecological processes within urban and urbanizing areas. Projects include restoration and management of habitat supporting endangered butterfly species, education of policymakers on impacts of artificial light and noise on wildlife, research on minimizing ecological effects of fuel modification.

Principal, Land Protection Partners 1998–present

Consultant to attorneys in land protection actions (primarily California Environmental Quality Act, California Coastal Act, and federal Endangered Species Act). Services include issue identification, preparation of biological analysis with supporting scientific literature review, and communication with resource agency personnel.

Research Associate, Sustainable Cities Program, University of Southern California 1999–2001

Summer Instructor, UCLA Graduate School of Education and Information Studies 1997–1999

Staff Researcher, UCLA Department of Geography 1996–1999

Teaching Assistant, UCLA Department of Geography 1995–1996

Geographic Information System Technician, Water Resources Agency, New Castle County, Delaware 1992–1993

Grants, Honors, and Awards

Professional

Santa Monica Bay Restoration Commission 2003

Grant of $131,000 to Los Angeles Conservation Corps and The Urban Wildlands Group to restore coastal dune and bluff vegetation and develop a master plan for restoration of El Segundo dune and bluff habitat.

Defense Logistics Agency 2003

Contract for $43,779 to The Urban Wildlands Group to conduct experimental captive propagation of endangered Palos Verdes blue butterfly.

James C. Zumberge Fund for Innovation, University of Southern California 2003

Grant of $50,000 for interdisciplinary investigation of phytoremediation with native plants.

Conservation and Research Foundation 2003

Grant of $5,000 to The Urban Wildlands Group to suuport preparation of book, *Ecological Consequences of Artificial Night Lighting.*

California ReLeaf 2003

Grant of $7,500 to The Urban Wildlands Group for project, "Urban Forest Assessment and Outreach at UCLA."

U.S. Department of the Navy 2002

Contract for $12,000 to The Urban Wildlands Group to salvage Palos Verdes blue butterfly pupae from Navy property to be disposed and developed.

U.S. Fish and Wildlife Service 2002

Contract for $10,000 to The Urban Wildlands Group to draft management plan for endangered Kern primrose sphinx moth.

U.S. Fish and Wildlife Service 2002

Contract for $24,000 to The Urban Wildlands Group to draft species recovery plan for endangered Calippe silverspot butterfly.

International Dark-Sky Association Executive Director's Award 2002

National Fish and Wildlife Foundation 2002

Grant of $5,000 to The Urban Wildlands Group to support conference *Ecological Consequences of Artificial Night Lighting.*

Electric Power Research Insitute 2002

Grant of $2,000 to The Urban Wildlands Group to support conference *Ecological Consequences of Artificial Night Lighting.*

Defense Logistics Agency 2002

Contract for $42,665 to The Urban Wildlands Group to conduct experimental captive propagation of endangered Palos Verdes blue butterfly.

U.S. Fish and Wildlife Service Landowner Incentive Program 2001

Grant of $37,300 to The Urban Wildlands Group to restore habitat for endangered El Segundo blue butterfly on private property in Torrance, California.

John Randolph Haynes and Dora Haynes Foundation — 2000

Co-author of $398,000 grant to USC Sustainable Cities Program to assess benefits of urban greening in a dense inner-city neighborhood.

Los Angeles Department of Water and Power — 2000

USC Sustainable Cities Program awarded $9,000 contract to assess "Cool Schools" tree planting program.

New Research Design Award for a More Sustainable Los Angeles Region, John Randolph Haynes and Dora Haynes Foundation — 2000

Awarded $5,000 to develop a research design for the use of native plants in phytoremediation.

Graduate

Conference Travel Grant, UCLA Department of Geography — 1999

Dissertation Improvement Grant, National Science Foundation ($8,000) — 1998

Distinguished Doctoral Scholar Fellowship, UCLA Alumni Association ($17,500) — 1998

Portable Fellowship, UCLA Graduate Division ($18,500) — 1997

Graduate Research Fellowship, National Science Foundation ($64,400) — 1993

Chancellor's Fellowship, UCLA Graduate Division (declined) — 1993

Undergraduate

Alexander J. Taylor Award ("Outstanding Senior Man"), University of Delaware — 1993

Geography Faculty Award, University of Delaware — 1993

Mid-Atlantic Region Finalist, Rhodes Scholarship — 1992

Fellow, Arizona Honors Academy, Northern Arizona University — 1992

Marie Donaghay Award for Excellence in Geography, University of Delaware — 1992

Phi Beta Kappa — 1992

Phi Beta Kappa Clift and DeArmond Award, University of Delaware — 1991

George and Margaret Collins Seitz Award, University of Delaware — 1991

Eugene duPont Memorial Distinguished Scholar Award, University of Delaware ($44,500) — 1989

Publications and Presentations

In Preparation

1. Rich, Catherine, and Travis Longcore (eds.). *Ecological consequences of artificial night lighting.* Island Press (scheduled 2004).

2. Longcore, Travis. Christina Li, and John P. Wilson. Nature's services in a dense urban neighborhood. *Environmental Managment.*

In Review

4. Longcore, Travis and Catherine Rich. Ecological light pollution. *Frontiers in Ecology and Environment.*

3. Longcore, Travis, Catherine Rich, and Dietland Müller-Schwarze. Management by assertion: beavers and vireos at Lake Skinner (Riverside County, California). *Ecological Restoration.*

2. Longcore, Travis, Christina Li, and John P. Wilson. Applicability of CITYgreen urban ecosystem analysis software to a dense urban neighborhood. *Urban Geography.*

1. Longcore, Travis. Ecological effects of fuel management practices around residential development. Sidebar for chapter by Kevin Shafer in text on California fire ecology.

Peer Reviewed Publications

11. Longcore, Travis. Arthropods as indicators of restoration success in coastal sage scrub (California, U.S.A.). *Restoration Ecology* 11(4):00–00 (2003).

10. Mattoni, Rudi, Travis Longcore, Zdenka Krenova, and Alison Lipman. Mass rearing the endangered Palos Verdes blue butterfly (*Glaucophsyche lygdamus palosverdesensis*: Lycaenidae). *Journal of Research on the Lepidoptera* 37:55–67 (2003).

9. Longcore, Travis, Rudi Mattoni, Cor Zonneveld, and Jorn Bruggeman. INsect Count Analyzer: a tool to assess responses of butterflies to habitat restoration. *Ecological Restoration* 21(1):60–61 (2003).

8. Zonneveld, Cor, Travis Longcore, and Claudia Mulder. Optimal schemes to detect presence of insect species. *Conservation Biology* 14(2):476–487 (2003).

7. Longcore, Travis. Ecological effects of fuel modification on arthropods and other wildlife in an urbanizing wildland. Pp. 000–000 in Galley, Krista E.M., Robert C. Klinger, and Neil G. Sugihara (eds.). *Proceedings of Fire Conference 2000: The First National Congress on Fire Ecology, Prevention, and Management.* Miscellaneous Publication No. 13, Tall Timbers Research Station, Tallahassee, Florida (2003).

6. Mattoni, Rudi, Travis Longcore, Cor Zonneveld, and Vojtech Novotny. Analysis of transect counts to monitor population size in endangered insects: the case of the El Segundo blue butterfly, *Euphilotes bernardino allyni. Journal of Insect Conservation* 5(3):197–206 (2001).

5. Longcore, Travis, Rudi Mattoni, Gordon Pratt, and Catherine Rich. On the perils of ecological restoration: lessons from the El Segundo blue butterfly. Pp. 281–286 in Keeley, Jon, Melanie Baer-Keeley, and C. J. Fotheringham, eds. *2nd Interface Between Ecology and Land Development in California,* U.S. Geological Survey Open-File Report 00-62, Sacramento, CA (2000). (Abstracted in *Ecological Restoration* 19(2):125 (2001).)

4. Mattoni, Rudi, Vojtech Novotny, and Travis Longcore. Arthropod monitoring for fine scale habitat analysis: A case study of the El Segundo sand dunes. *Environmental Management* 25(4):445–452 (2000).

3. Mattoni, Rudi and Travis R. Longcore. The Los Angeles coastal prairie, a vanished community. *Crossosoma* 23(2):71–102 (1997).

2. Mattoni, Rudi, Gordon F. Pratt, Travis R. Longcore, John F. Emmel and Jeremiah N. George. The endangered Quino checkerspot butterfly, *Euphydryas editha quino* (Lepidoptera: Nymphalidae). *Journal of Research on the Lepidoptera* 34:99–118 (1997).

1. Longcore, Travis R. and Peter W. Rees. Information technology and downtown restructuring: the case of New York City's financial district. *Urban Geography* 17(4):354–372 (1996).

Book Reviews

2. Longcore, Travis. Review of *From Coastal Wilderness to Fruited Plain: A History of Environmental Change in Temperate North America from 1500 to Present*, by Gordon G. Whitney. *Ethics, Place and Environment* 4(3):278–279 (2001).

1. Longcore, Travis. Review of *Butterflies on British and Irish Offshore Islands: Ecology and Biogeography*, by Roger Dennis and Tim Shreeve. *Journal of Research on the Lepidoptera* 35:139–140 (2000).

Scientific Reports and Publications

31. U.S. Fish and Wildlife Service [Anderson, Alison, with Edith Allen, Mark Dodero, Travis Longcore, Dennis Murphy, Camille Parmesan, Gordon Pratt, and Michael Singer]. Recovery plan for the Quino checkerspot butterfly (*Euphydryas editha quino*). Portland, Oregon, U.S. Fish and Wildlife Service, x + 179 pp. (August 11, 2003)

30. Longcore, Travis, and Catherine Rich. Review of biological impact analysis in Initial Study and Mitigated Negative Declaration (PD-S-942/TT5411), City of Simi Valley. Los Angeles, Land Protection Partners, 15 pp. (July 24, 2003).

29. Longcore, Travis, and Catherine Rich. Conservation value of Catellus West Bluffs property justifies purchase with public funds, Los Angeles, Land Protection Partners, 11 pp. (May 2, 2003).

28. Pincetl, Stephanie, Jennifer Wolch, John Wilson, and Travis Longcore. Toward a sustainable Los Angeles: a "nature's services" approach. Los Angeles, USC Center for Sustainable Cities, 47 pp. (report to John Randolph Haynes and Dora Haynes Foundation, February 2003).

27. Longcore, Travis, Catherine Rich, John Marzluff, and Barbara Nightingale. Peer review of artificial light and noise impact analysis in *Sand Point Magnuson Park Drainage, Wetland/Habitat Complex and Sports Fields/Courts Project Final Environmental Impact Statement [Seattle, Washington]*. Los Angeles, Land Protection Partners, 15 pp. (January 16, 2003).

26. Longcore, Travis, and Catherine Rich. Review of biological resources analysis in Malibu Bay Company Development Agreement Draft Environmental Impact Report. Los Angeles, Land Protection Partners, 28 pp. (November 11, 2002).

25. Longcore, Travis, and Catherine Rich. Action plan for Kern primrose sphinx moth (*Euproserpinus euterpe*) at Carrizo Plain National Monument. Los Angeles, The Urban Wildlands Group. 15 pp. (report to U.S. Fish and Wildlife Service, November 1, 2002).

24. Longcore, Travis, Rudi Mattoni, Alison Lipman, Zdenka Krenova, and Catherine Rich. Final report for Palos Verdes blue butterfly year 2002 captive rearing on Defense Fuel Support Point, San Pedro, California. Los Angeles, The Urban Wildlands Group (Defense Logistics Agency Agreement # N68711-02-LT-00010). 18 pp. (October 1, 2002).

23. Longcore, Travis, and Catherine Rich. Effects of light and noise from a proposed Wal-Mart

"Supercenter" on the wildlife of Penjajawoc Marsh (Bangor, Maine). Los Angeles, Land Protection Partners. 18 pp. (June 7, 2002).

22. Longcore, Travis and Catherine Rich. Protection of environmentally sensitive habitat areas in proposed Local Coastal Plan for City of Malibu. Los Angeles, The Urban Wildlands Group. 19 pp. (May 2002).

21. Mattoni, Rudi and Travis Longcore. Census results for Palos Verdes blue butterfly and associated species, 1994–2001. Pp. 2–10 in Mattoni, Rudi (ed.) *Status and trends: habitat restoration and the endangered Palos Verdes blue butterfly at the Defense Fuel Support Point, San Pedro, California, 1994–2001.* Los Angeles, The Urban Wildlands Group (April 2002).

20. Mattoni, Rudi, Travis Longcore, and Alison Lipman. Description of habitat characteristics of the Palos Verdes blue butterfly. Pp. 11–15 in Mattoni, Rudi (ed.) *Status and trends: habitat restoration and the endangered Palos Verdes blue butterfly at the Defense Fuel Support Point, San Pedro, California, 1994–2001.* Los Angeles, The Urban Wildlands Group (April 2002).

19. Longcore, Travis. Invertebrate community composition as an indicator of restoration success. Pp. 52–68 in Mattoni, Rudi (ed.) *Status and trends: habitat restoration and the endangered Palos Verdes blue butterfly at the Defense Fuel Support Point, San Pedro, California, 1994–2001.* Los Angeles, The Urban Wildlands Group (April 2002).

18. Longcore, Travis and Jeremiah George. Habitat Evaluation for El Segundo Blue Butterfly (*Euphilotes bernardino allyni*) at Malaga Bluffs. Los Angeles, The Urban Wildlands Group (report to U.S. Fish and Wildlife Service Cooperative Agreement #1448-11430-1-J041, December 30, 2001).

17. Longcore, Travis and Catherine Rich. A review of the ecological effects of road reconfiguration and expansion on coastal wetland ecosystems. Los Angeles, The Urban Wildlands Group. 12 pp. (November 14, 2001).

16. Longcore, Travis and Catherine Rich. Review of biological resources analysis in draft Sully-Miller/Fieldstone Communities Environmental Impact Report (SCH#99101125). Los Angeles, Land Protection Partners. 15 pp. (October 19, 2001).

15. Longcore, Travis and Catherine Rich. Review of biological resources analysis in LAX Master Plan Draft Environmental Impact Statement/Environmental Impact Report. Los Angeles, Land Protection Partners. 27 pp. (August 8, 2001).

14. Longcore, Travis and Catherine Rich. Review of biological resources analysis in City of Malibu Negative Declaration No. 00-010 (Kempin Single Family Residence). Los Angeles, Land Protection Partners. 5 pp. (July 23, 2001).

13. Young, Terrence, with Travis Longcore. *Creating Community Greenspace: A Handbook for Developing Sustainable Open Spaces in Central Cities.* Los Angeles, California League of Conservation Voters Education Fund. 64 pp. (2000).

12. United States Fish and Wildlife Service (Alison Anderson, Edith Allen, Mark Dodero, Camille Parmesan, Travis Longcore, Gordon Pratt, Dennis Murphy, and Michael Singer). Draft Recovery Plan for the Quino Checkerspot butterfly (*Euphydryas editha quino*). Portland, Oregon (2000).

11. Longcore, Travis, Kyle Fitzpatrick, and Maureen Phelan. Assessment of Los Angeles Department of Water and Power Cool Schools Program, University of Southern California Sustainable Cities Program (report to Los Angeles Department of Water and Power, December 2000).

10. Mattoni, Rudi and Travis Longcore. 2000 Palos Verdes Blue Butterfly (*Glaucopsyche lygdamus palosverdesensis*) Adult Population Survey (report to U.S. Fish and Wildlife Service, August 28, 2000).

9. Lassiter, Unna, Travis Longcore, and Stephanie Pincetl. 53rd and Latham: Residents' Preferences for Amenities for an Urban Park, University of Southern California Sustainable Cities Program (report to City of Los Angeles, Department of Recreation and Parks, January 2000).

8. Mattoni, Rudi, Travis Longcore, and Rick Rogers. 1999 Palos Verdes Blue Butterfly (*Glaucopsyche lygdamus palosverdesensis*) Adult Population Survey (report to U.S. Fish and Wildlife Service, August 28, 1999).

7. Lipman, Alison, Travis Longcore, Rudi Mattoni, and YinLan Zhang. Habitat Evaluation and Reintroduction Planning for the Endangered Palos Verdes Blue Butterfly (report to California Department of Fish and Game, June 1, 1999).

6. Mattoni, Rudi, Travis Longcore, Jeremiah George, Gordon Pratt, and Chris Nagano. Recovery Plan for the El Segundo Blue Butterfly (Euphilotes battoides allyni). Portland, Oregon (September 9, 1998).

5. Mattoni, Rudi, Travis Longcore, and Rick Rogers. 1998 Palos Verdes Blue Butterfly (*Glaucopsyche lygdamus palosverdesensis*) Adult Population Survey (report to U.S. Fish and Wildlife Service, June 10, 1998).

4. Mattoni, Rudi, Gordon Pratt, Travis Longcore, Jeremiah George, and Jan Leps. Interim Report 1997: Conservation Planning for the Endangered Laguna Mountains Skipper, *Pyrgus ruralis lagunae* (report to U.S. Forest Service, January 1998).

3. Pratt, Gordon, Rudi Mattoni, Travis Longcore, Jeremiah George, Cecelia Pierce, and Chris Nagano. Distribution of Quino Checkerspot Butterfly (*Euphydryas editha quino*) in Southern San Diego County and Related Observations (report to U.S. Bureau of Land Management, January 1998).

2. Mattoni, Rudi, Arthur Bonner, Jeremiah George, and Travis Longcore. 1997 Annual Report: Defense Fuel Support Point Revegetation, Chevron Pipeline Mitigation (report to U.S. Fish and Wildlife Service, August 1, 1997).

1. Mattoni, Rudi, Arthur Bonner, Jeremiah George, Travis Longcore, Catherine Rich, and Rick Rogers. 1997 Palos Verdes Blue Butterfly (*Glaucopsyche lygdamus palosverdesensis*) Adult Population Survey (report to U.S. Fish and Wildlife Service, June 30, 1997).

Popular Articles and Miscellaneous Reports

10. Longcore, Travis, and Catherine Rich. Urban oaks and urban oak woodlands. *Oaks* (newsletter of the California Oak Foundation), pp. 3, 7 (2003).

9. Longcore, Travis. Fire clearance. *Los Angeles Times* (April 29, 2000)

8. Longcore, Travis. Further enlightenment. Malibu Times (February 4, 1999).

7. Longcore, Travis. Ask campus community about changes. *Daily Bruin,* p. 12 (May 19, 1998).

6. Longcore, Travis, editor. Biological assessment: coastal sage scrub at University of California, Los

Angeles. Prepared by Geography 123, Dr. Rudi Mattoni, Lecturer (unpublished report, December 1997).

5. Longcore, Travis. The Endangered Delhi sand dunes. *Western Tanager* 63(8):1–2 (1997).

4. Longcore, Travis. LAAS Year in review. *Western Tanager* 63(7):1–3 (1997).

3. Longcore, Travis. Election special: comparative excerpts from party platforms. *Western Tanager* 63(3):1–3 (1997).

2. Longcore, Travis. Big Birdathon Day. *Western Tanager* 63(1):1–3 (1997).

1. Rich, Catherine and Travis Longcore. Consultation issues at UCLA: landscape and construction (unpublished report, February 1996).

Conference Presentations

15. Longcore, Travis and Catherine Rich. Ecological Consequences of Artificial Night Lighting in Natural Lands Management. Invited paper presented at George Wright Society Biennial Conference (San Diego, California, April 14-18, 2003).

14. Li, Christina, Travis Longcore, and John Wilson. The Association of American Geographers 98th Annual Meeting (New Orleans, Louisiana, March, 2003)

13. Longcore, Travis, Cor Zonneveld, Jorn Bruggeman, and Rudi Mattoni. *Tracking population responses of the endangered Palos Verdes blue butterfly to habitat enhancement using INCA (INsect Count Analyzer).* The Ecological Society of America 87th Annual Meeting/Society for Ecological Restoration 14th Annual International Conference (Tucson, Arizona, August 4–9, 2002)

12. Longcore, Travis and John P. Wilson. *Applicability of CITYgreen urban ecosystem analysis software to a densely built urban neighborhood.* The Association of American Geographers 98th Annual Meeting (Los Angeles, California, March 19–23, 2002).

11. Longcore, Travis. *Obvious and insidious effects of sprawl on wildlife* (invited plenary speaker). Smart Growth for Californians and Wildlife, National Wildlife Federation and Planning and Conservation League (San Diego, California, May 19–20, 2001)

10. Longcore, Travis. *Ecological effects of fuel modification on arthropods and other wildlife in an urbanizing wildland.* Fire Conference 2000: The First National Congress on Fire Ecology, Prevention and Management (San Diego, California, November 27–Decembver 1, 2000).

9. Longcore, Travis. *Response of terrestrial arthropod communities in coastal sage scrub to short-term climate change.* The Association of American Geographers 96th Annual Meeting (Pittsburgh, Pennsylvania, April 5–9, 2000).

8. Longcore, Travis. *Terrestrial arthropods and restoration: if you build it, will they come?* Society for Ecological Restoration Eleventh Annual Conference/Xerces Society Annual Meeting (The Presidio of San Francisco, September 23–25, 1999).

7. Longcore, Travis. *Putting the bugs in: assessing ecological restoration with terrestrial arthropods.* The Association of American Geographers 95th Annual Meeting (Honolulu, Hawaii, March 23–27, 1999)

6. Longcore, Travis and Catherine Rich. *419 acres: UCLA's natural history. 1. Land use, 2. Biological*

homogenization, 3. Island biogeography. Poster series and display presented at California's Biodiversity Crisis: The Loss of Nature in an Urbanizing World (UCLA, October 24–25, 1998).

5. Mattoni, Rudi, Jeremiah George, Travis Longcore, and Gordon Pratt. *Scale and the resonating impact of an exotic plant.* Southern California Academy of Sciences Annual Meeting (California State University, Fullerton, May 2–3, 1997).

4. Longcore, Travis, Rudi Mattoni, Gordon Pratt, and Catherine Rich. *On the perils of ecological restoration: lessons from the El Segundo blue butterfly.* 2nd Interface Between Ecology and Land Development in California (Occidental College, Los Angeles, California, April 18–19, 1997).

3. Mattoni, Rudi, Travis Longcore, Jeremiah George, and Catherine Rich. *Down memory lane: the Los Angeles coastal prairie and its vernal pools.* Poster presented at 2nd Interface Between Ecology and Land Development in California (Occidental College, Los Angeles, California, April 18–19, 1997).

2. Longcore, Travis. *The role of science in Natural Community Conservation Planning.* Restoring Our Commitment to Recovery in the Era of the Habitat Conservation Plan, Endangered Species Defense Coalition (Starr Ranch, California, July 30, 1996).

1. Longcore, Travis. *Mainland colonization by endemic insular taxa.* XXXth Annual Southwest Population Biology Conference (James Reserve, California, April 20–21, 1996).

Invited Presentations

South Coast Wildlands Project Missing Linkages Workshop, August 2002

University of Southern California, Department of Geography, February 2002

Santa Monica Mountains Conservancy, September 2001

California Native Plant Society, South Coast Chapter, August 2001

California State University, Northridge, Olivatt Library, April 2001

University of California Natural Resources Continuing Conference, Wrigley Institute for Environmental Studies, April 2001

Society for Ecological Restoration, California Chapter Annual Conference, October 2000

University of Stockholm, Department of Zoology, September 2000

University of Gothenberg, Department of Applied Environmental Science, September 2000

Lorquin Entomological Society, Los Angeles, California, June 2000

University of California, Los Angeles, Department of Geography, May 2000

Southern California Institute of Architecture, June 1998

Los Angeles Unified School District Target Science, "Butterflies in the City" Workshop Series, South Central Los Angeles Leadership Team, October 1998

Professional Service

Referee, *Restoration Ecology, Journal of Research on the Lepidoptera, Environmental Management, Transactions in GIS*

Independent Scientific Advisor (Quino checkerspot butterfly), County of San Diego, 2002

Baldwin Hills Park Citizens Advisory Committee, 2002

Conference Co-Chair, The Urban Wildlands Group and UCLA Insitute of the Environment, *Ecological Consequences of Artificial Night Lighting*, 2001–2002

Member, Advisory Council, Yosemite Restoration Trust, 1999–present

Member, Recovery Team (Technical Subteam), Quino Checkerspot Butterfly, U.S. Fish and Wildlife Service, 1999–present

Newsletter Layout, Endangered Habitats League, 1998–2002

Member, Conference Steering Committee, UCLA Institute of the Environment, *California's Biodiversity Crisis: The Loss of Nature in an Urbanizing World*, 1998

Managing Editor, Journal of Research on the Lepidoptera, 1997–1999

Member, Recovery Team, El Segundo Blue Butterfly, U.S. Fish and Wildlife Service, 1997–1998

Member, Environmental Review Board, County of Los Angeles (appointed by Los Angeles County Board of Supervisors), 1997–present

Editor, *Western Tanager*, newsletter of the Los Angeles Audubon Society, 1997

Vice President, Los Angeles Audubon Society, 1995–1997

Coordinator, Los Angeles Audubon Society Birdathon, 1996 (recognized by National Audubon Society, "Most Money Raised by a Rookie," September-October issue of *Audubon* magazine)

Graduate Student Association Representative, UCLA Academic Senate Council on Planning and Budget, 1996–1999

Member, Graduate Affairs Committee, UCLA Department of Geography, 1995–1997

Member, Instructional Technology Committee, UCLA Department of Geography, 1993–1995

Professional Affiliations

Member, Ecological Society of America

Member, Association of American Geographers

Member, Society for Ecological Restoration

Member, Southern California Botanists

Member, California Botanical Society

Public Communication

Associated Press, *Boston Globe, Daily Breeze* (Torrance, California), *Daily Bruin* (Westwood, California), *Los Angeles Times, Metro Santa Cruz* (Santa Cruz, California), *Riverside Press-Enterprise* (Riverside, California), *Sacramento News and Review* (Sacramento, California), *San Jose Mercury News,* Scripps Howard News Service (Washington, DC), *The Christian Science Monitor* (Boston), *The Globe and Mail* (Toronto), *California Wild, Discover, Life, People, Science, Science News, Reader's Digest* (Canada), National Geographic Television ("America's Endangered Species: Don't Say Goodbye"), NBC Nightly News, ABC News, CNN Radio Español, National Public Radio ("Talk of the Nation"), BBC World Service

CATHERINE RICH
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Education

UCLA Department of Geography, M.A. June 1997. Emphasis in biogeography, urban wildlife, environmental philosophy. Thesis: *Polioptilaphilia? Toward an Understanding of the Role of Human Emotion in Nature Preservation.* Teaching Assistant: Biogeography, Physical Geography, People and the Earth's Ecosystems.

UCLA School of Law, J.D. June 1981. Member, State Bar of California. Co-founder and Associate Editor, *UCLA Journal of Environmental Law and Policy.* Co-founder and officer (faculty liaison), UCLA Environmental Law Society.

University of California, Berkeley, A.B. March 1978 (with Distinction). Pre-medical course, psychology major. Member, Board of Directors, U.C. Berkeley CalPIRG (1976–1977). Co-founder, U.C. Berkeley CalPIRG (1976).

Professional Experience

Co-founder and Executive Officer, The Urban Wildlands Group (1996–present). Organization studies and works to protect species, habitats, and ecological processes within urban and urbanizing areas. Projects include restoration and management of habitat supporting endangered butterfly species, public education about effects of noise and artificial night lighting on wildlife, promotion of humane approaches to wildlife management, research on minimizing ecological effects of fuel modification.

Principal, Land Protection Partners (1998–present). Consultant to attorneys in land protection actions (primarily California Environmental Quality Act, California Coastal Act, federal Endangered Species Act). Services include issue identification, preparation of biological analysis with supporting scientific literature review, communication with resource agency personnel.

Contract Attorney, Law Offices of Jonathan Kirsch (1999–present). Trademark and publishing law.

Copy Editor, *Journal of Research on the Lepidoptera* (1997–1999).

Legal/Policy Consultant (1989–1992). Projects included assisting in the preparation of lawsuit (*Nordlinger v. Lynch*) challenging property tax assessment scheme mandated by Proposition 13 (for Center for Law in the Public Interest).

Deputy, Los Angeles City Councilman Marvin Braude (1987–1988). Formulated and developed environmental policies and programs. Represented councilman before city boards, commissions, and committees, and at community meetings. Coordinated councilman's reelection campaign for seat on AQMD Board.

Community Representative (1985–1986). Directed successful effort to prevent developer from demolishing five contiguous apartment buildings in an unredeveloped Westwood neighborhood. Persuaded Los Angeles City Council to enact a local building moratorium, then successfully represented local community before Planning and Environment Committee of the City Council in a hardship exemption hearing requested by developer. Prepared architectural and historical documentation for Historic Preservation Overlay Zone application.

Staff Attorney, California Commission on Campaign Financing (1984–1985). Contributed to two-volume report on legislative campaign financing (*The New Gold Rush: Financing California's Legislative Campaigns*).

Full-time staff member, Gary Hart presidential campaign (1984). Field desk contact for Northern California; Los Angeles regional co-coordinator. Appointed to Credentials Committee of the 1984 Democratic National Convention.

Attorney, Paul, Hastings, Janofsky & Walker (1983). General civil litigation.

Editor/Assistant, Professor Charles M. Firestone (1982–1983). Edited Firestone and Johnson's *Cases and materials on communications law and policy*; assisted in preparations for conference, UCLA Communications Law Program/International Bar Association Symposium on International Satellite Television.

Research Assistant, Professor Richard Abel (Summer 1980). Compiled information on workplace exposure to toxic substances.

Intern, Hollywood Revitalization Committee (funded by National Trust for Historic Preservation) (Summer 1979). Evaluated feasibility of establishing a façade easement program for Hollywood's historic buildings.

Research Assistant, Professor Laura Nader (funded by National Highway Traffic Safety Administration) (Spring 1978). Research on social costs of automobile accidents.

Research Assistant, Professor Laura Nader (Summer 1977). Participated in study funded by Energy Research & Development Administration evaluating feasibility of alternative energy systems in California. Interviewed officials involved with the implementation of Energy Conservation Standards for New Residential Buildings.

Peer Reviewed Publications

Rich, Catherine, and Travis Longcore (eds.). *Ecological consequences of artificial night lighting.* Island Press (in preparation for 2004 publication).

Longcore, Travis, and Catherine Rich. Ecological light pollution. *Frontiers in Ecology and Environment* (in review).

Longcore, Travis, Catherine Rich, and Dietland Müller-Schwarze. Management by assertion: beavers and vireos at Lake Skinner (Riverside County, California). *Ecological Restoration* (in review).

Longcore, Travis, Rudi Mattoni, Gordon Pratt, and Catherine Rich. On the perils of ecological restoration: lessons from the El Segundo blue butterfly. Pp. 281–286 in Keeley, Jon, Melanie Baer-Keeley, and C.J. Fotheringham, eds. *2nd Interface Between Ecology and Land Development in California*, U.S. Geological Survey Open-File Report 00-62, Sacramento, CA (2000). (Abstracted in *Ecological Restoration* 19(2):125 (2001).)

Scientific Reports

Longcore, Travis, and Catherine Rich. Review of biological impact analysis in Initial Study and Mitigated Negative Declaration (PD-S-942/TT5411), City of Simi Valley. Los Angeles, Land Protection Partners, 15 pp. (July 24, 2003).

Longcore, Travis, and Catherine Rich. Conservation value of Catellus West Bluffs property justifies purchase with public funds. Los Angeles, Land Protection Partners, 11 pp. (May 2, 2003).

Longcore, Travis, Catherine Rich, John Marzluff, and Barbara Nightingale. Peer review of artificial light and noise impact analysis in Sand Point Magnuson Park Drainage, Wetland/Habitat Complex and Sports Fields/Courts Project Final Environmental Impact Statement [Seattle, Washington]. Los Angeles, Land Protection Partners, 15 pp. (January 16, 2003).

Longcore, Travis, and Catherine Rich. Adequacy of biological resources analysis in Heschel West School Draft Environmental Impact Report. Los Angeles, Land Protection Partners, 23 pp. (December 11, 2002).

Longcore, Travis, and Catherine Rich. Review of biological resources analysis in Malibu Bay Company Development Agreement Draft Environmental Impact Report. Los Angeles, Land Protection Partners, 28 pp. (November 11, 2002).

Longcore, Travis, and Catherine Rich. Action plan for Kern primrose sphinx moth (*Euproserpinus euterpe*) at Carrizo Plain National Monument. Los Angeles, The Urban Wildlands Group, 15 pp. (report to U.S. Fish and Wildlife Service, November 1, 2002).

Longcore, Travis, Rudi Mattoni, Alison Lipman, Zdenka Krenova, and Catherine Rich. Final report for Palos Verdes blue butterfly year 2002 captive rearing on Defense Fuel Support Point, San Pedro, California. Los Angeles, The Urban Wildlands Group (Defense Logistics Agency Agreement # N68711-02-LT-00010), 18 pp. (October 1, 2002).

Longcore, Travis, and Catherine Rich. Effects of light and noise from a proposed Wal-Mart "Supercenter" on the wildlife of Penjajawoc Marsh (Bangor, Maine). Los Angeles, Land Protection Partners, 18 pp. (June 7, 2002).

Longcore, Travis, and Catherine Rich. Protection of environmentally sensitive habitat areas in proposed Local Coastal Plan for City of Malibu. Los Angeles, The Urban Wildlands Group, 19 pp. (May 30, 2002).

Longcore, Travis, and Catherine Rich. A review of the ecological effects of road reconfiguration and expansion on coastal wetland ecosystems. Los Angeles, The Urban Wildlands Group, 12 pp. (November 14, 2001).

Longcore, Travis, and Catherine Rich. Review of biological resources analysis in draft Sully-Miller/Fieldstone Communities Environmental Impact Report (SCH #99101125). Los Angeles, Land Protection Partners, 15 pp. (October 19, 2001).

Longcore, Travis, and Catherine Rich. Review of biological resources analysis in LAX Master Plan Draft Environmental Impact Statement/Environmental Impact Report. Los Angeles, Land Protection Partners, 27 pp. (August 8, 2001).

Longcore, Travis, and Catherine Rich. Review of biological resources analysis in City of Malibu Negative Declaration No. 00-010 (Kempin Single Family Residence). Los Angeles, Land Protection Partners, 5 pp. (July 23, 2001).

Mattoni, Rudi, Arthur Bonner, Jeremiah George, Travis Longcore, Catherine Rich, and Rick Rogers. 1997 Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*) adult population survey (report to U.S. Fish and Wildlife Service, June 30, 1997).

Rich, Catherine, and Travis Longcore. Consultation issues at UCLA: landscape and construction (unpublished report, February 1996).

Nader, Laura, Norman Milleron, Joseph Palacios, and Catherine Rich. Belief, behavior, and technologies as driving forces in transitional stages — the people problem in dispersed energy futures. Pp. 177–238 in *Distributed energy systems in California's future: a preliminary report, Volume 2*. Washington, D.C.: Energy Research & Development Administration (September 1977).

Conference Presentations

Longcore, Travis, and Catherine Rich. Ecological consequences of artificial night lighting in natural lands management. Invited paper presented at George Wright Society Biennial Conference, San Diego, California (April 14–18, 2003).

Longcore, Travis, and Catherine Rich. *419 acres: UCLA's natural history. 1. Land use, 2. Biological homogenization, 3. Island biogeography.* Poster series and display presented at California's Biodiversity Crisis: The Loss of Nature in an Urbanizing World (UCLA, October 24–25, 1998).

Longcore, Travis, Rudi Mattoni, Gordon Pratt, and Catherine Rich. *On the perils of ecological restoration: lessons from the El Segundo blue butterfly.* Paper presented at 2nd Interface Between Ecology and Land Development in California (Occidental College, Los Angeles, California, April 18–19, 1997).

Mattoni, Rudi, Travis Longcore, Jeremiah George, and Catherine Rich. *Down memory lane: the Los Angeles coastal prairie and its vernal pools.* Poster presented at 2nd Interface Between Ecology and Land Development in California (Occidental College, Los Angeles, California, April 18–19, 1997).

Grants and Awards

Santa Monica Bay Restoration Commission. Grant of $131,000 to Los Angeles Conservation Corps and The Urban Wildlands Group to restore coastal dune and bluff vegetation and develop a master plan for restoration of El Segundo dune and bluff habitat (2003).

Defense Logistics Agency. Contract for $43,779 to The Urban Wildlands Group to conduct experimental captive propagation of endangered Palos Verdes blue butterfly (2003).

Conservation and Research Foundation. Grant of $5,000 to The Urban Wildlands Group to support preparation of book, *Ecological Consequences of Artificial Night Lighting* (2003).

California ReLeaf. Grant of $7,500 to The Urban Wildlands Group for project, "Urban Forest Assessment and Outreach at UCLA" (2003).

U.S. Department of the Navy. Contract for $12,000 to The Urban Wildlands Group to salvage Palos Verdes blue butterfly pupae from Navy property to be disposed and developed (2002).

U.S. Fish and Wildlife Service. Contract for $24,000 to The Urban Wildlands Group to develop Recovery Plan for endangered Callippe silverspot butterfly in San Francisco area, California (2002).

U.S. Fish and Wildlife Service. Contract for $10,000 to The Urban Wildlands Group to develop Action Plan for endangered Kern primrose sphinx moth on BLM land in the Carrizo Plain National Monument, California (2002).

National Fish and Wildlife Foundation. Grant of $5,000 to The Urban Wildlands Group to support conference, *Ecological Consequences of Artificial Night Lighting* (2002).

Electric Power Research Institute. Grant of $2,000 to The Urban Wildlands Group to support conference, *Ecological Consequences of Artificial Night Lighting* (2002).

Defense Logistics Agency. Contract for $42,665 to The Urban Wildlands Group to conduct experimental captive propagation of endangered Palos Verdes blue butterfly (2002).

U.S. Fish and Wildlife Service Landowner Incentive Program. Grant of $37,300 to The Urban Wildlands Group to restore habitat for endangered El Segundo blue butterfly on private property in Torrance, California (2001).

International Dark-Sky Association Executive Director's Award, "In recognition of her enthusiastic efforts in the pursuit of the promotion of Dark Skies" (2002).

International Dark-Sky Association Executive Director's Award, "For outstanding service in protecting our nighttime environment" (2001).

Selected Activities and Memberships

Conference Co-Chair, The Urban Wildlands Group/UCLA Institute of the Environment, *Ecological Consequences of Artificial Night Lighting* (2002)
Advisor, California Wildlife Foundation (2002–present)
Member, Advisory Council, California Oak Foundation (1999–present)
Member, Conference Steering Committee, UCLA Institute of the Environment, *California's Biodiversity Crisis: The Loss of Nature in an Urbanizing World* (1998)
President, Los Angeles Audubon Society (1996–1997)
Conservation Co-Chair, Los Angeles Audubon Society (1995–1996)
Second Vice President, Los Angeles Audubon Society (1994–1995)
Member, Advisory Committee, Los Angeles County 1996 Proposition A. Successfully lobbied for inclusion of, and wrote, statement in Proposition A's preamble pertaining to the importance of maintaining biological diversity within the County, and successfully lobbied for creation of a competitive grant category for habitat acquisition and/or restoration.
Member, Society for Conservation Biology
Member, Cooper Ornithological Society